THE ENGINEERING AND MINING JOURNAL

Mineral Production of Missouri.

Advance sheets from the report of Secretary J. W. Marsteller, of the Bureau of Mines of Missouri, give the value of the minerals produced in that State during the year 1904 as follows:

Ore.	Quantity.	Value.
Zinc, lb	476,786,000	$8,255,174
Lead, lb	270,052,000	6,451,418
Coal, tons	4,368,129	7,003,078
Copper ores	.....	6,865
Nickel	.....	25,382
Cobalt	.....	89,708
Iron ores	.....	190,311
Barytes	.....	176,644
Kaolin and tripoli	.....	40,380
Total	.....	$22,238,960
For 1903	.....	20,352,976
Increase in 1904	.....	$1,885,985

To the 1904 output should be added the value of the marble, granite, building stone, cement rock, lime rock and fireclay, amounting to $4,218,426, making a total of $26,451,097.

The copper, nickel and cobalt ores were mined in Madison county. Iron ores were mined in 13 counties, Crawford, St. Francois and Christian furnishing most. Barytes came from nine counties, Washington and St. Francois being the large producers. Tripoli came from Newton county; Kaolin from Miller and Morgan. The output of zinc and lead ores is given in the following table, in short tons:

County.	Zinc Ore. Tons.	Lead Ore. Tons.
Barry	212	....
Benton	183	50
Camden	....	31
Christian	275	95
Cole	....	120
Crawford	....	27
Dade	140	60
Franklin	....	1,362
Greene	1,350	480
Hickory	12	17
Howell	4,115	....
Jasper	202,513	27,891
Jefferson	1,475	461
Lawrence	13,579	1,101
Madison	....	9,153
Miller	....	30
Moniteau	213	187
Morgan	90	190
Newton	14,131	1,650
Oregon	30	....
Ozark	60	....
St. Francois	....	89,354
Washington	15	2,634
Webster	....	32
Wright	....	51
Total	$238,393	$135,026

Zinc ores show a product of 238,393 tons, which embraces 21,601 tons of the silicates and carbonates. This is an increase of 45,368,000 lb. over 1903. The value of the 1904 product is $8,255,174, and compared with 1903, shows an increase of $1,464,960, or 17.7%. The average price received for all grades of zinc for the year 1904 was $36.33 per ton. The silicates and carbonates averaged $17.50 per ton. The lead ore product amounts to 135,026 tons, of which 1,276 tons represent the dry-bone mined. Of this total amount, the eastern district produced 103,682 tons, or 77.6%. The latter ore does not average as well per ton in price as in the Joplin or western district, as it averaged but $45.61 per ton. The 30,068 tons of lead proper averaged in the western district $56 per ton, while the 1,276 tons of dry-bone averaged $30.85 per ton.

The Joplin district leads all other sections of the State as well as the nation. Its output for the year of zinc ore amounts to 467,790,000 lb., while the remainder of the State produced 11,996,000 lb. of zinc ore. Jasper county produced, during the year, 91% of all the ore mined in the Joplin district, having to her credit for zinc and lead production during the year the sum of $8,869,607.

St. Francois county, in the eastern district, like Jasper county in the west, continues its great lead in the production of lead ore. It furnished during the year 86.3% of all the lead ores produced in the eastern district—this, too, in the face of the closing down of three large plants on account of strikes for a considerable time. The product of the county for the year is valued at $4,038,094 in all.

Auriferous Galena.

BY J. NELSON NEVIUS.*

Recently, in examining a mining prospect in Sonora, I encountered an occurrence of gold entirely new to me; it was a case of an impurity in lead sulphide. The galena is rather coarsely crystalline, the fracture showing cleavage planes averaging about one-half inch; these planes are considerably warped, similar to the face of a dolomite crystal. The mineral is unusually dark colored and lacks the customary brilliancy; it tarnishes even more readily than is usual with this sulphide. These characteristics, however, are not sufficiently marked to suggest anything unusual about the mineral.

On discovering that it contained high values, both in gold and silver, three samples of the galena were taken from different parts of the vein, care being taken to eliminate other minerals. These were pulverized, washed in a horn-spoon to remove any particles of quartz, calcite, pyrite and other associated minerals, and assayed. The average result of the assays was: Ag, 268.3 oz.; Au, 15.2 oz. to the short ton—the three samples running very uniformly. Lacking the means to grind a microscopic section of the mineral, the dust was examined under the microscope; but no free gold was observed, the metal being apparently as intimately associated with the lead sulphide as is the more common silver content.

This galena occurs in a quartz vein that varies in width from 2 to 15 ft., cutting through a country of granitoid rock (apparently aplite), and paralleled by a dike of greenstone. The main part of the vein is massive, vitreous quartz, in places nearly white and nearly barren; but the greater part of it includes bunches and masses of brown calcite, a black mineral (probably tourmaline), and bunches of galena. In other parts the quartz is heavily iron-stained from decomposed pyrite, and is porous and honeycombed. From the latter material some fine specimens of wire gold have been taken, and all of this material shows gold by horn-spooning. The calcite and tourmaline, as well as the quartz, frequently carry visible gold in small and large grains. The average value of the ore in the vein is: Ag, 20.2; Au, 0.2 oz. per short ton.

This type of quartz vein is one of the commonest in central and northern Sonora, but has received little attention from prospectors, the vein of San Francisco mine, at Llano station, being the only one of the kind that has been persistently developed.

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Gold and Silver in the Phliippines.

H. D. McCaskey, chief of the Mining Bureau, Philippine Islands, reports that gold and silver have been found in Luzon and Visayas. In Suyoc, just south of Mancayan, Lepanto, important prospects are being developed by American miners at the present time. Gold and copper ores both occur there. In Benguet important development work has been done, particularly in the district of Antamok. The orebodies are apparently extensive, and it is known that much of the ore is of a good grade, the most important pay streaks now worked averaging over $12 per ton. Much of the ore so far uncovered is free-milling. In the Bataan district the Philippine Gold Mining, Power & Development Co. has opened a number of drifts, but has not yet suceeeded in getting its 10-stamp mill upon the ground.

In the Bued river district Hanson and Meade have uncovered a gold-copper lead, upon which a 3-stamp mill will be erected at once. In this district also are outcrops of lead, iron, copper, and zinc sulphides. In Pangasinan, in the foothills of the northern Zambales range, near Salasa, a number of claims have been recorded. The ores are copper carbonate and sulphide.

In Nueva Ecija, near Gapan, and Peñaranda, on the Rio Chico and elsewhere, extensive deposits of placer gold have been known for many years. No veins are yet reported, but prospecting in the placer ground is being actively prosecuted. In Camarines Province the Spanish concessions upon the extensive gold deposits in the district of Paracale and Mambulao have been largely relocated by American mining men under the present laws and some work has been done in the reopening of abandoned shafts and in preparation for future systematic development. The ores are sulphides of iron, copper, lead and zinc, in part complex smelting ores, and in part suitable for milling and cyanidation or chlorination. The placers have yielded important amounts of gold in the past, some of the nuggets being unusually large.

Pyrite Mining in St. Lawrence County, New York.

BY ROBERT B. BRINSMADE.*

The rolling meadow country in the southern part of St. Lawrence county is intersected by metamorphic schists of the Oswegatchie series of the Cambrian; their strike is northeast. The pyrite deposits lie in these schists; their range extends from the Cole mine (see Fig. 1) four miles north of Gouverneur, to the High Falls mine, 14 miles northeast. The orebodies vary locally, but in general are bedded veins conformable to the schist, containing pyrite in a quartz and feldspar gangue. Pyrrhotite occurs in quantity in the High Falls mine.

The three producing mines are the Cole, the Stella and the High Falls. The openings on the Alexander Farr farm, 2½ miles northeast, on the Geo. Styles farm, 1½ miles east, and on the Steve Hendricks place, 1 mile south of the village of Bigelow, are as yet only prospects; as is likewise the Graham pit, 2 miles northeast of the Stella mine.

The Cole mine, owned by the Adirondack Pyrite Co., of Gouverneur, has been opened within a few years and has been producing more or less steadily. It was first begun by a pit on the outcrop (which here strikes northwest), and was later pierced by an incline at 30° to a depth of 150 ft. Stoping from this incline (the deposit being 8 to 12 ft. thick) extended 30 ft. to a pinch on the right and about 75 ft. on the left, where a fault with about 5-ft. throw is shown near the incline bottom. By crosscutting the apparent hanging wall, a large orebody parallel with the schists was encountered. So far, the development has shown a body 100 ft. long by 60 ft. wide, extending overhead to grass roots, and in depth unexplored. The hanging wall is good, and there is no need for roof support by timber. The formation permits a machine-drill to do 70 to 100 ft. of holes in 10 hours. These conditions contribute to a cheap extraction of the ore. A two-drill straight-line air-compressor, a hoisting engine, driven by a belt from the mill, and a No. 2 Cameron pump, comprise the mine machinery.

The Cole concentrator is at present the best equipped on the range. The mine skip dumps directly on a platform before two 14 by 18 in. Blake crushers (one is a relay), from which the ore is spouted to a set of 12 by 24 in. Cornish rolls, with steel-spring buffers. Water is fed to both crusher and rolls. From the rolls the material is raised by a 14-in. rubber-belt bucket-elevator to a trommel, 36 in. diameter and 6 ft. length, with 3-16-in. round holes; this is set at 1:20 slope, and is connected to its driving pulley by a flexible joint. The trommel oversize is recrushed in 14 by 19-in. rolls, and fed back to the trommel head by a second bucket elevator.

The trommel undersize, 3-16-in. particles and less, descends in four equal streams to four Hartz jigs, alike in form and adjustment. Each jig has three (24 by 32 in.) beds, with four-mesh No. 16 wire screens. Each bed is 4 in. deep at the lower and 5½ in. at the upper end, below the parting weirs. The jig pistons are wood, with rubber-belt packing rings, and are actuated by the usual eccentrics. The concentrate is drawn both off the screen and from the hutch into a central flume leading to a bucket elevator. The elevator raises the concentrate to the top of the mill and spouts it either directly through a 3-in. pipe to load box-cars direct, or to elevated storage bins. The jig tailing runs to the boot of a centrifugal sand pump, which elevates it to a flume leading to the tailing heap outside. Power for the mill and the mine hoist comes from a Woodbury simple non-condensing engine, with automatically regulated Meyer valve gear. The steam is supplied by three return-tubular boilers.

The raw ore is usually 20 to 30% sulphur, and the concentrate goes 40 to 50%. The tailing assays over 5% in suphur. Trials at the Stella mine on similar ore showed that graded sizing and hydraulic classifying before jigging did not make appreciably higher-grade concentrate than the system above described. The tailing was lower, but because of the added attendance, interest and repairs, due to increased apparatus, the profit was less. Also, there was more slime saved, but it is not desired by pyrite burners. In spite of this last disadvantage, it ought to pay to make leaner tailings. This could be done by working the last of the three jig beds thin to produce a middling product. These middlings (half pyrite and half gangue, that now go to waste) could then be reground in rolls and re-treated on fine jigs or Overstrom tables.

The following is the labor cost of operating the Cole mine and mill for a production on an average run of 55 tons concentrate from an average of 110 tons of raw ore:

Mining—Two shifts of 10 hours each.	
1 pit boss	$2.50
4 Italian muckers	6.00
2 American muckers	3.50
One shift	$12.00
Two shifts	$24.00
2 rock drills, day shift, on contract @ 7c. per ft.—140 ft. average	9.80
Total mine labor	$33.80
Per ton raw ore	.307
Per ton concentrate	.614
Milling—Two shifts of 10½ hours, net, each.	
1 engineer	$2.92
1 fireman	1.75
1 shift boss	2.75
2 jigmen	5.50
1 head crusherman	1.90
2 assistant crushermen	3.30
1 car loader	1.90
One shift	$20 02
Two shifts	$40.04
Per ton raw ore	.37
Per ton concentrate	.74

The labor cost for mining is reasonably low, but for milling it is excessively high. In southeast Missouri, with more elaborate apparatus and a closer saving, the total cost per ton of raw ore need not exceed 30c., as compared with 23% more here for labor cost alone, due largely to the inexperience of the mill men.

The Stella mine, which was the first opened of the pyrite mines of this district, was actively worked until the failure of its owners in 1900. It remained idle until after the burning of the concentrator in 1904, when the property was sold to the St. Lawrence Pyrite Company.

There are five known parallel veins on the property, with a northeast strike, but only two have so far been developed. To date, all shipments have been from the western vein, whose incline adjoins the site of the destroyed mill. This incline is 16 ft. wide, and 700 ft. deep, at an angle of about 30°. It is devoid of timber, the mica schist hanging wall being strong enough to permit stopes 60 to 80 ft. wide between pillars. The stopes were excavated by driving drifts every 30 to 50 ft. along the incline and removing the ore by breast stoping and raising around the rock pillars necessary to support the roof. The stopes were extended until the ore became too lean (which was 75 ft. south and 125 ft. north of the incline), and averaged 12 ft. in thickness. There is no sharp distinction in this or the other pyrite veins between vein matter and walls, mineral occurring in the walls for some distance beyond the pay ore. The new owners are now exploring this vein by drifting south from the old stopes along the hanging wall (which is similar schist to the foot-wall but a better ore guide); and on the upper level, after traversing 100 ft. of the lean, they have again entered the good ore. This shows that this vein extends farther on the strike, payably, than the first owners supposed.

Recent test pitting from the surface has shown that a vein about a quarter of a mile east of the old mine has ore for at least 1,500 ft. along its strike. An incline at about 30° has been sunk in this vein, with a skip and ladderway; employing for ventilation, a centrifugal steel fan, sucking air through a wood pipe 10 in. sq., laid in the ladderway. This incline will ultimately be used only for men, supplies and pipes, as a two-compartment ore incline has just been started, about 300 ft. to the south. This latter incline is an innovation in the region, inasmuch as it will be sunk in the foot-wall, in order to preserve a uniform grade and to save the loss of ore in shaft pillars, necessary with vein inclines. As yet, only a prospecting outfit of a 8x12-in. hoist and a two-drill, straight-line compressor has been put on this vein, but a 4-in. air pipe is being run from the large compressor near the mill and a complete equipment will be installed for hoisting later.

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The St. Lawrence Pyrite Co. is now preparing plans for a new concentrator and through a subsidiary company will renovate the old branch railroad extending 2½ miles to the main line of the R. W. & O. railroad at DeKalb Junction. When the present plans are carried out the Stella will be the heaviest producer on this range.

The High Falls mine, the most northerly of all (Fig. 1) has recently been transferred to the National Pyrite Co., of Canton. The concentrator merits little technical study, inasmuch as it has only two jigs, arranged with crusher and trommel in a similar, but less effective, way

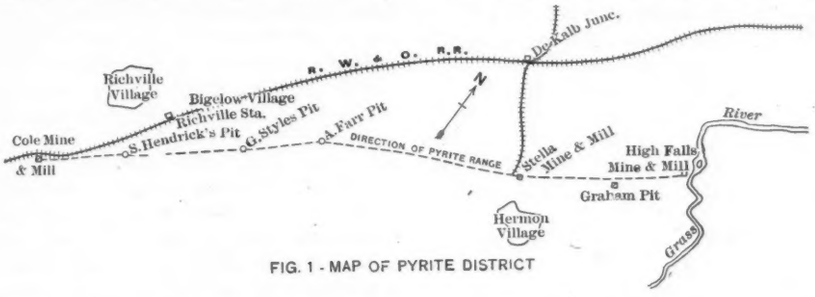

FIG. 1 - MAP OF PYRITE DISTRICT

than in the Cole mill. The capacity is 50 tons of raw ore, from which 20 to 30 tons of concentrate is shipped.

Of more interest is the mine, whose vein runs to the northeast and passes under the Grass river, which also marks the northern boundary of the company's land. The vein walls dip to the west, while the pay-shoots dip north, as shown in longitudinal section in Fig. 2. Incline No. 1 was sunk in the southern pay-shoot and all the ore extracted from the upper levels. To save the long drifts to reach the pay-shoot as incline No. 1 became deeper, incline No. 2 was started in the northern pyrite shoot within 50 ft. of the river. It was expected that the shoot of

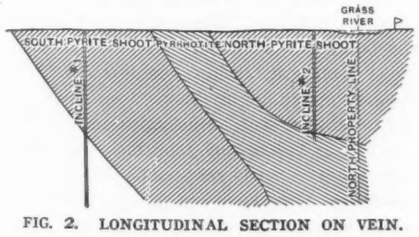

FIG. 2. LONGITUDINAL SECTION ON VEIN.

pyrrhotite and gangue that lay between the two pyrite shoots, would not be encountered before the 600-ft. level should be reached, but a sharp decrease in dip of the pyrrhotite shoot caused it to be encountered near the 200-ft. level and future operations will thus be greatly handicapped.

The future of this district depends chiefly on commercial considerations. There is plenty of pyrite ore to be mined. A considerable market exists in the sulphite pulp industry of the Adirondacks. Many shipments have also gone to sulphuric-acid works. The pyrite contains no impurities objectionable to acid makers.

Recent Advances in the Electro-Metallurgy of Iron and Steel.*

BY R. S. HUTTON.

The application of the electric furnace to the metallurgy of iron has been largely founded on the experience in the manufacture of calcium carbide. Carbide furnaces have been and are being largely used for the production of rich ferro-alloys, such as ferro-chromium and ferro-silicon.

As the production of calcium carbide became less and less remunerative, and as the demands of the market for these ferro-alloys became satisfied, definite attempts were made to tackle the problem of the direct reduction of iron ores. It might seem to be rather a hopeless task which the electro-metallurgist has thus set himself; for direct competition with the blast-furnace is obviously out of the question, so far as our own and probably all other present iron-producing countries are concerned.

On the other hand, there are certain advantages which can be gained by electric heating, and, although the electric reduction of iron ores is at the moment unremunerative, we may expect to hear more of it in the future, when electric-furnace construction is more advanced.

Every ton of pig iron produced in the blast-furnace requires very nearly one ton of coke for its production. Of this amount, only one-third is necessary for the chemical reduction of the ore, the balance being employed in producing and maintaining the requisite temperature. This two-thirds of the fuel supply can be replaced by electric heating.

In actual practice, only the simple case of reducing the ore and allowing the carbon monoxide to pass away unused has been tried, and with this process the following results have been obtained. Various methods have been proposed by Héroult, Harmet and others for utilizing the total heat of combustion of carbon. Under these conditions, it should be possible to reduce iron ore with a much smaller power expenditure.

Recently, thanks to the foresight of the Canadian Government, a commission was sent to Europe to investigate the electrical methods of producing iron and steel, and its report gives us valuable independent evidence of the power expenditure in the various processes which they studied.

Actual results of power expenditure per 1,000 kg. product in practice are as follows:

	Mean Power on Furnace, Kw.	Kw.-hrs.	H-P.yrs.
(1) Keller (Canadian Commission)—			
A. Gray pig (4.2% C., 2% Si)	613	3420	0.522
B. White pig (3.0% C., 0.7% Si)	226	1620	0.25
(2) Stassano (Goldschmidt)..	80	3155	0.48
(3) Heroult (Canadian Commission)	182	3380	0.517
(4) Morrison.....	270	2233	0.34
For comparison with these figures:			
(5) 70% Ferro-chromium Willson Al. Co. (Haber).....	300?	7950	1.21
(6) 30% Ferro-silicon Willson Al. Co. (Haber).....	300?	5930	0.91

In experiment (1) A., nearly 10 tons of gray pig iron were manufactured during a 55 hours run, 28 taps being taken from the furnace. 15,943 kg. of ore were charged containing 54.1% Fe.

In (1) B., about 6¾ tons of pig were produced in 48 hours, but the energy consumption being kept low, only a very small quantity of the impurities in the ore was reduced. The average amount of coke used per metric ton of product in the two experimental runs was 370 kg.

In (3): This was a very small scale experiment, less than 1 ton of metal being obtained in 16 hours; the ore was moreover of poor grade, containing about 35.5% iron; it is therefore surprising that the power expenditure was not higher.

For (5) and (6) it must be remembered that both chromium and silicon oxides require a very much higher power consumption for their reduction (1 kg. silicon from SiO_2 requires 6414 cal. as compared with 1780 cal. for 1 kg. iron from Fe_2O_3).

F. W. Harbord, of the Canadian Commission, says: "Pig iron can be produced on a commercial scale to compete with the blast-furnace, only when electric energy is very cheap and fuel very dear. On the basis taken in this report, with electrical energy at $10 per horsepower-year, and coke at $7 per ton, the cost of production is approximately the same as the cost of producing pig iron in a modern blast-furnace."

In considering electric steel production it is necessary to judge the electric-furnace methods entirely on their own merits and not according to whether they approach more or less nearly to the usual metallurgical process they are proposing to displace. The whole *modus operandi* of an electric furnace is so different from that of a fuel-heated furnace that its advantages and disadvantages are seldom apparent if judged by a direct comparison of the two methods. It is rather from the products which result in the two cases and from the costs of production that conclusions should be drawn. During the last two or three years much has been accomplished.

The most important consideration is the power expenditure, and this in ten authenticated tests varied from 0.07 to 0.186 per 1,000 kg. product per h.p.-year, the mean being about 0.13.

It is almost equally important to consider what is the quality of the steel manufactured, as also what is the nature of the raw materials required for its production.

*Abstract of a paper in *Journal* Soc. Chem. Ind., June 15, 1905.

There seems to be good evidence to show that steel, equal in quality to the best Sheffield crucible steels, can be produced in the electric furnace. This can be accomplished either in such a furnace as that of Kjellin, which, in its present form, is used almost entirely for melting up carefully chosen raw materials, and does not rely on any considerable refining of the material; or on the other hand, with the Héroult furnace, by which such a product can be obtained starting with almost any grade of raw material, this process relying essentially on its capability of rapidly and completely refining pig iron or ordinary scrap steel. The economical advantages of using a cheap grade of raw material for producing high quality crucible steels will doubtless tell in favor of such a method.

It is largely to such possibilities of refining and to the relatively high cost of fuel per ton of product for the manufacture of crucible steel, that the electrical processes owe their advantages.

In Great Britain, where coal is cheap, it is almost certain that much of this heating could be more economically carried out by the combustion of fuel. In the case where molten iron or low-grade steel can be run into the electric furnace, it will be seen that the power expenditure required for refining it and bringing up its quality to that of a crucible steel is indeed very low. Along such lines as these, the electric furnace may be expected to find still wider applications than in the manufacture of high-grade crucible steel.

At La Praz, in the south of France, a three-ton Héroult furnace has been regularly working since the end of 1900, and has turned out more than 3,000 tons of high-quality steel. Recently a plant has been installed at Kortfors, in Sweden, while within the last few months a company has been floated in Germany with $200,000 capital, to work the Héroult steel process. At the present time a 50-ton furnace is in course of construction at La Praz.

The Kjellin furnace has been worked for some years at Gysinge, in Sweden, and the German rights have been recently taken over by Siemens & Halske, of Berlin. The 170-kw. furnace is capable of turning out over five tons per day, and with a 736-kw. furnace now under construction, it is hoped to raise this to 30 to 36 tons. Recent improvements enable refining of the crude steel to be satisfactorily accomplished by adding the necessary amount of iron ore to the slags.

At Livet the Keller steel furnace was shown to the Canadian Commission and seems to be very similar in function to that of Héroult. Captain Stassano has continued his work with the rotating furnace, in which the materials are heated by radiation from an arc which is maintained above their surface. In this furnace, both iron ore reduction and steel production have been carried out on a satisfactory scale. The crucible furnace of P. Girod, of Courtepin (Switzerland), and Ugine (Savoy), has been used almost exclusively for the manufacture of high-grade ferro alloys such as are required for the manufacture of special steels. Its ingenious construction may render it of still wider application.

Gustave Gin has considerably modified his original process of steel production by arranging the narrow channels, in which the metal is heated by the resistance which it offers to the passage of the electric current, in direct connection with wide basins in which the refining is effected. This method is being applied at Plettenburg, in Westphalia.

A somewhat similar modification has been adapted to the induction furnace by Schneider & Co., of Creusot, narrow tubes surrounded by the high-tension coils being arranged in series with a reservoir to which the metal to be treated is added and in which the refining is effected. With these modifications, many of the difficulties due to the rapid corrosion by the slags of the refractory lining of such narrow channels should be overcome.

The Career of the Gold Dredge in New South Wales.*

BY DAVID K. BLAIR.

It is now five years since the advent of gold dredging in New South Wales, Australia; the credit for its introduction rests with Chas. L. Garland, who commenced operation in March, 1899. In this paper it is intended to give a brief history of the career of the gold dredge in New South Wales from that date up to the present time.

Up to the present, gold dredging in New South Wales cannot be designated as an unqualified success. Legitimate investing (as well as unscrupulous promoting) was encouraged by the success of some of the New Zealand dredging companies; however, the fact that these corporations were not over-capitalized (and to this reason, and in a large degree, was due their prosperity) was not sufficiently recognized. Owing to an improper diversion of funds raised by the selling of shares, an insufficient amount was left for construction and equipment. Thus, in numerous cases, about £15,000 was raised, but only about 50% of this was available for installation and operation.

In risking its money, the general public expects to receive a commensurate return, at any rate, from 20 to 50%; it considers 10% insufficient, as that dividend can be obtained in some industrial and commercial investments. The problem in New South Wales works out thus: Return per week for average well-managed dredge on average claim, 25 oz., say, £100; average working expenses, 15 oz., say, £60; net profit per week, 10 oz., say, £40; or for an average working year of 46 weeks, 460 oz., say £1,840; this is equal to 12¼% on a capital of £15,000. The ordinary mining investor does not consider such a return good enough.

In New Zealand, the capital would be only half the sum mentioned, perhaps considerably less; therefore, assuming the working expenses to be the same, the dividend would be about 25%—a fair dividend for a mining venture. In each instance nothing has been "written off" for depreciation of plant or for a reserve fund, so that these dividends would be actually less than the examples given. In nearly every instance the New South Wales dredge is unable to pay dividends. The rental (£1 per acre) levied by the Government for a gold-dredging lease in the original act was excessive (as compared with that of the other Australian States and New Zealand); a reduction was made by Parliament, late in 1902, to 2s. 6d. per acre and a 1% royalty on the total gold won. This reduction met with general approval.

All New South Wales dredges are of the paddock type, there being no auriferous navigable stream, such as the Molyneux river in New Zealand. All the dredging fields are worked-out alluvial diggings; the dredges are simply turning over tailing left, or stuff discarded, by the first miners. Occasionally there were left claim walls and blocks of ground too wet to be attacked by the miner; it is on such spots that a dredge may make a rich clean-up. Some of the rivers (by analogy based on the richness of their banks and beaches) were supposed to offer good prospects, but the experience of five well designed and constructed dredges proved the contrary.

All the dredges may be classed in three groups: Northern, Western and Southern; the latter group includes also the Eastern. The Northern group includes all the dredges north of Sydney; they have all been failures, with one exception (which won a fair amount of gold, also some tin, and which is well equipped). The Western group consists of ten dredges, eight of which may be classified as successful. The Southern group includes eight dredges; three companies, operating four dredges, have been successful. Several dredges have been converted into the sluice-box type, the elementary form in New Zealand. The tables and stacker are removed and a screen with larger perforations is used; coarse material is shunted overboard; the fine is run through a sluice which has the double function of saving gold and discharging tailing at a distance from the dredge. It is often asked: How is it that gold-dredging has been such a failure in this State? It is not out of place to mention a few points.

In the first place, the initial overcapital-

*Abstract of a paper in *Trans.* of the Australasian Institute of Mining Engineers, Vol. X.

ization (mentioned earlier in this paper), reduced the funds available for the construction of the plants; nearly all these were installed in 1899 and 1900.

Secondly, metal prices were phenomenally high; in fact, they might be termed record years. Manufacturers in Great Britain were busy, and Australian work was thrown to one side for South African and urgent local orders; resulting in much delay. Some companies, in their anxiety to get a start, disregarded quality of material and took anything available locally; the sequel was a series of incessant breakdowns. This frightened the more timid shareholders in adjoining claims, who were waiting for proper material to arrive to complete their plants; they, becoming restless with the belief that dredging was unsuitable for this country, faced their first loss, and forfeited in terms of the No-Liability Act, under which all these companies were registered. In most of the £15,000 companies, only about £6,000 was actually available for expenditure on dredge construction proper. One dredge (for the design and construction of which only £3,250 was available) worked continuously for three years having a tilted slate bedrock to dredge. Thus, thirdly, few of the dredges in New South Wales are constructed sufficiently strong to work the hard bedrock which they encounter. New South Wales usually has hard bedrock slate, sandstone and granite; the two latter, when decomposed, are soft, hence the success of the dredges in these districts. An important factor contributing to the success of New Zealand dredging, is the soft bedrock on which the alluvium lies. A hard bedrock, as slate, requires machinery specially heavy and strong in every detail; and cast steel must enter largely into its structure. These features necessarily mean additional cost.

Another important factor concerns the dredge-master and the crew. Too frequently the dredge-master is over-ruled by directors who have needy (and useless) friends for whom they wish to find work. Such a policy has often resulted unfortunately, as dredge crews are comparatively small. Some of the dredge-masters appointed to dredges in New South Wales were neither mechanics, nor had they ever seen a gold dredge until they stepped aboard to take command. The best man is a properly trained and qualified engineer. The number of dredges that have been sunk by the carelessness and stupidity of their crews is appalling. Also, the designers are partly responsible for not subdividing their dredge-hulls into more water-tight compartments, with efficient independent pumping connections for each compartment.

It is true that faults similar to those heretofore mentioned occur in all systems of mining. While admitting the truth of these remarks, I hazard the observation that gold dredging is a new industry; knowing the many defects in previous systems of mining, such faults should be eliminated from a new system till it attains strength to struggle for itself.

The argument advanced that New South Wales is not a dredging country, is true only in part; it is inferior to New Zealand in this respect, namely, the hardness of the gold-carrying bedrock in many alluvial fields. The boulders and timber are no worse than those of New Zealand. The scarcity of water is a myth; during the whole of the past two years of unprecedented drought, no dredge has suspended operations for want of water.

In conclusion, if more money were spent in the first instance on the dredge itself, we should have stronger and more efficient plants to deal with our ground. Moreover, more money should be spent in prospecting the claim in a reliable manner by means other than with the dredge itself, as hitherto done. Greater attention should be given to the selection of competent dredge-masters and crews. Dredges well built and economically operated by rationally organized corporations, have a profitable future in New South Wales.

In the discussion, Mr. F. Danvers Power said dredging properties are expensive to test thoroughly; consequently people prefer to rely on records, probabilities, and a little panning of the surface. Testing by boring is not satisfactory, and a small prospecting-dredge means considerable outlay. It must be remembered that there were not many experienced dredge-masters at the commencement of the dredging boom in New South Wales.

Mr. John W. Jaffray considered that much of the gold dredged in New South Wales escaped, owing to the tables being either too crowded or else not properly constructed to cope with fine material so different from that generally found in New Zealand.

Mr. Chas. L. Garland said that the failure of several propositions was due to over-capitalization, but not to the extent mentioned. As the pioneer of Australian dredging, he (Mr. Garland) had given his engineers *carte blanche* for the cost of plant; yet he did not get a machine sufficiently strong to cope with the ground; he was left to his own ingenuity to reconstruct. It is difficult to strengthen a weak dredge; although he had succeeded, it was at sacrifice of time and money. The chief troubles are rough bedrock, heavy boulders, and much timber. The success of gold dredging is largely governed by the cubic yardage turned over. A dredge that is always meeting with heavy timber and rough bottom cannot pay unless the ground is rich. He did not approve of increasing the area of the gold-saving tables. Gold never seems to get down more than 3 or 4 ft. from the screen; with a sluice-box it might be different. It is advisable to minimize both length and width of tables; length, by reason of the fact that gold does not travel far; width, because 15 ft. of screen is ample for disintegrating, except in the case of tenacious material. An average table should be 15 ft. in width, with a length of 10 ft. on each side of the screen; in practice this will be ample. Any excess means unnecessary wear and tear of matting and expanded metal.

T. Murray said that it is desirable to secure particulars as to the extent of ground worked, the gold won, the quantity of material treated by the best equipped plants, and their yields. In Victoria, inefficient bucket-dredges were tried in the eighties, but without success. The alluvium was mostly layers of boulders, gravelly wash, sand and loam, with some clay. The main lead on the bedrock was 100 to 250 ft. from the surface; and then the wash dirt there had to be won by sinking and driving. The dredges were usually working on "false bedrock," 20 ft. below the surface. During the five years (ending Dec. 31, 1903) 18 bucket-dredges were working. The area of ground treated by them was 284 acres, recovering 26,479 oz. from 6,614,417 cu. yd. The ounces per acre won averaged 93.23; the grains of gold, per cubic yard washed, being 1.92. With a few exceptions, the plants were worked for a substantial profit. Details of the progress for each year are shown in the table given herewith.

Year.	No. of Bucket Dredges.		Area of Ground Worked.	Cu. Yds. Dredged.	Yield of Gold.
	Worked.	Shut Down.	Acres.		Oz.
1899.....	3	.....	3½	75,000	200
1900.....	6	1	18	311,643	1,046
1901.....	6	1	56	1,278,073	4,096
1902	10	1	73½	1,848,877	6,584
1903.....	15	.....	133	3,100,824	14,553
Total	.....	3	284	6,614,417	26,479

For the year 1903,3 the maximum number of cu. yd. treated per week by a plant was 8,240; the minimum, 1,898; the average, 5,185. For one year's work, the dredge with the highest yield cleaned up 1,695 oz. from 12 acres, containing 339,203 cu. yd. of material, or 2.39 grains per cu. yd. Based on last year's output, it would take over two centuries to dredge the ground available in Victoria.

Of the 18 plants (working prior to Jan. 1, 1904), 13 were sucessful. Of the remainder, four were financial failures, because of poor design and construction; the other, because of unsuitable ground. One plant was sunk and raised three times, two others, once. In most cases the dredges have been changed to the "single-lift sluice-box type." Bucket dredging, though an economical means of treating friable, gravelly, sandy and loamy wash dirt, does not recover all the gold, especially that in the crevices of hard bedrock and in clay. Comparison with other plants working in the same locality, shows

that the bucket-dredge leaves about one-half the gold in the ground; but both operate at a profit. In the case of the bucket-dredge, though less gold is won, the expense of working is only about one-half that of the others. As to the future, in addition to the 15 bucket-dredges at work on the 31st of December, 1903, nine were in course of construction.

A persual of the table given, shows that the industry in Victoria is steadily advancing. With care in prospecting, with skill in the operation of powerful machinery of the proper type, and by minimizing the number of paid-up shares in a company, there is no reason why this method of mining should not prove a profitable investment. It is probable that dredging will probably become an important factor in the mining operations of Victoria. With the protection of public and private interests, it will be an unquestioned advantage to the community.

Mr. Blair thought that Mr. Jaffray's views regarding table areas are against modern practice; in fact, table areas are being cut down in every instance.]

Electrolytic Refining of Silver.*

BY ANSON G. BETTS.†

There are in practical use two electrolytic refining processes, viz., the Moebius and the Balbach. These differ in the means adopted to prevent the spongy silver deposits from reaching the anodes and short-circuiting the cells. Certain objections to these processes appear, among which are the ungainly apparatus used, high resistance of the solution, collection of the silver in a loose condition with consequent trouble and the necessity of inclosing the bullion anodes in cloth bags to keep the gold out of the electrolytic silver. There are also certain chemical objections in the requirement of anodes practically free from other metals than copper and silver and the more precious metals. Lead in the anodes is said to go into lead peroxide, especially when the solution contains copper, and this lead peroxide is hard to get out of the gold residue.

Present progress in the recovery of silver is in the direction of collecting the silver of the ores ultimately as an anode slime from the electrolytic refining of base metals. This anode slime will contain the bismuth of the ore, and this is at present mostly wasted, the amount thus lost apparently being considerably greater than the total present consumption of the metal.

According to the *American Electrician* (Oct., 1905) a century-old engine at Greencroft Mill, Hyde, England, has just been displaced by a steam turbine.

*Notes from a paper read at the eighth general meeting of the American Electrochemical Society, held at Bethlehem, Pa., September 18, 19 and 20, 1905.

†Metallurgical chemist, Troy, N. Y.

Coal Mining in Arkansas.

BY W. R. CRANE.*

The coalfields of Arkansas are the southeastern extension of the Western-interior region, the western portion of which lies in the Indian Territory. The coals of both the Indian Territory and Arkansas are high-grade bituminous and semi-anthracite, even approaching anthracite in character in the extreme eastern portion. They are largely used for steam production and coke making; that from certain localities, as the Jenny Lind and Spadra districts, is much sought for domestic purposes.

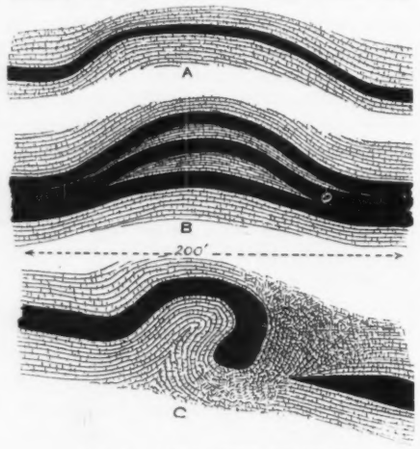

FIG. 1. LOCAL DISTURBANCES.

Up to the present, mining operations (including prospecting and development) have been confined largely to Sebastian, Johnson, Scott, Logan and Franklin counties, although only the first three can be considered of commercial importance. A small district, including the mines at Spadra and Coalhill, produce so-called anthracite; the product of the other counties is semi-anthracite of considerable range in character.

Geologically considered, these coals belong to the Carboniferous, which, in the northern portion of this coal region, is productive of bituminous coal exclusively; the change from bituminous to semi-anthracite coal is the result of rather extensive orographic movements, as evidenced by the rough and broken country of the Arkansas fields. A number of isolated hills (some 200 to 300 ft. high), and short lines of ridges, are located in the southern and southern central parts of the fields. Therefore, the coal strata have suffered considerable distortion and have been formed into basins, more or less irregular in shape. These isolated hills usually occupy the center of basins, the coal pitching from all sides toward them; but with the ridges, it is not unusual to find the coal outcropping part way up the slopes, and having the same pitch as the sides.

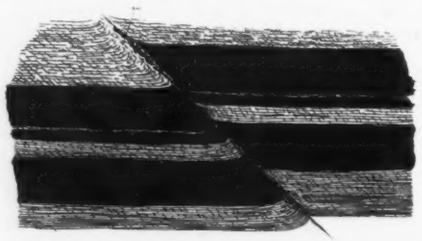

FIG. 2. SHOVE, OR REVERSE-FAULT.

The Hartford-Huntington and Bonanza coal is probably identical with that known as the "Hartshorne" of the Indian Territory; *i. e.*, it belongs to the same horizon.

The coal varies in thickness from 2½ to 8½ ft. A few local variations are as follows: At Spadra, 2½ to 4 ft.; at Coalhill, 3 to 4 ft.; at Jenny Lind, 5 to 7 ft.; at Midland, 3 to 4 ft.; and at Prairie Creek, 7 to 8½ ft. The "Mammoth" seam, as mined at Prairie Creek, occasionally varies as much as 18 to 24 in. in one-half a mile.

It is usual for the coal strata to decrease in thickness with increased depth of cover; but the reverse of this is occasional (as at Midland, where the coal increases fully 6 in. in thickness in a distance of 2,000 ft. down the pitch). However, abrupt and continuous variations in thickness of coalbeds are the exception; gradual variations in thickness of both coal and shale partings are not uncommon, and may become permanent.

The coalbeds are usually separated into a number of "benches" by "partings" of shale; these partings vary in thickness from a fraction of an inch to a foot or more. Furthermore, such variations may be abrupt; and, when partings occur as "subtops" (false roofs), excessive local thickening may develop "bells" which are a constant source of danger. A coal stratum, divided into benches by shale partings by a thickening of the same, may be separated into several individual strata; however, these benches may reunite and continue as before (see *B*, Fig. 1).

In the Arkansas coalfields the roof is usually an uncertain and unreliable factor; it is usually shale, and in many localities is extremely irregular in quality and thickness. With the Mammoth seam is associated a brittle, shelly sub-top, the thickness of which varies from 8 to 18 in. and causes considerable extra work and expense in its support or removal. It falls in large masses and without warning. In fact, it is so extremely weak that rooms are often closed by falls before they can be worked out; this is especially true of mines that have been standing idle for several months. Further, such roofs are especially susceptible to the weakening effect of the sweating season which lasts from June to October.

Occasionally sandstone or quartzose rock forms the roof of the coal, which is, however, seldom continuous for any great distance. At Prairie creek (mine No. 4 of the Mammoth Coal Mining Company) there is 70 ft. of quartzose roof-rock; half a mile to the west, it has decreased in

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thickness to 40 ft.; and ultimately it "tails out" and shale takes its place. There are many other similar occurrences, but few with such great thickness of rock cover.

The floor is composed of shale, or fireclay; and although not especially hard, it is firm. It is quite rough and pitchy, and often has to be taken up to insure the proper grade. Owing to the occurrence of the coal in basins, the strike of the coal strata is naturally extremely irregular. The dip of the coal is also variable, but ranges from 2° to 25° or 30°, probably averaging 6° to 8°. Local variations in both strike and dip are quite common and often quite pronounced, due to folds and counterfolds crossing one another.

The orographic movements, that formed the coal into basins, produced various local disturbances in the coal itself and in the associated strata, such as folds and faults (see *A, B* and *C,* Fig. 1 and 2). Faults, with displacements of a few inches up to 20 ft., have been found. Subsidence faults are usual; although "shove," or reverse, faults are occasionally encountered (Fig. 2). Crystals of calcite and gypsum are often found in the unclosed fissures of faults (*a,* Fig. 2). Such open fissures are the source of much water. Such phenomena as "horsebacks" are practically unknown; although clay slips are occasionally met. Bells are common and assume peculiar shapes (see Fig. 3). A lenticular mass of shale entirely surrounded by coal, as shown (*B,* Fig. 3) is common.

The cleat, or "slip," of the miners, is often quite pronounced; it varies from a few inches to 3 or 4 ft. apart. Those farthest apart are usually the most prominent. Water and clay, entering the lines of fracture of the cleavage, form lines of weakness that are troublesome and often dangerous. The direction of the cleat is usually parallel with the strike of the coal strata; but, owing to the number and complexity of the lines of disturbance, the cleats often cross one another, thus rendering mining easy. However, much small coal results when the cleavage planes are numerous, and especially when they cross one another. Owing to the lack of uniformity in direction and development of the cleavage planes, it is not always possible to take advantage of them in mining. However, when they are well developed, they aid materially in driving entries and working breasts.

Considerable sulphur is present in most of the districts. Its presence in the coal or in adjacent top- or bottom-rock is made known by the appearance of white bands, the result of weathering.

Method of Mining.—Room-and-pillar work is employed; up to the present time, no other method has been tried. However, at Prairie, in the Spadra district, a mine is being opened by slope in which long-wall mining by panels will be used.

Owing to the presence of outcrops and fairly steep pitches, the mines are commonly developed by slopes and entries; the former are driven in the coal on the full pitch; the latter are run normal to the slopes. Owing to the occurrence of folds and faults, especially the former, where practicable, slopes are often driven in the coal but part of the way. Of necessity the rooms must be driven to the rise, *i. e.,* up the pitch; or, if the pitch is too steep, at such an angle as to permit cars to be delivered to the working face or breast by hand. The grade of the room-track seldom exceeds 6°; and, as the pitch of the coal strata is moderate, no special arrangement of entries is usually necessary to maintain such a grade.

Parallel with the main slopes are the air-ways (one on either side), and parallel with the main entries are back entries or air-ways. Present practice in arrangement of slopes, shafts, entries, etc. (together with dimensions of the same) are shown in the table given herewith.

All the mines are practically slope mines, though many of them are opened

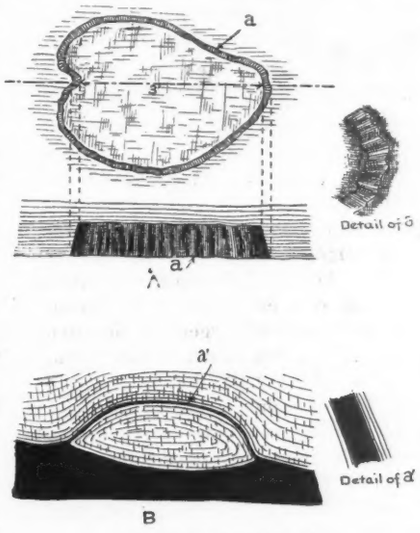


FIG. 3. BELLS IN ROOF.

by shafts. From the bottom of the shafts, slopes are driven, with the usual arrangement of air-ways and entries.

The slopes and main entries are "brushed down" to 5½ to 6 ft. from top of rail. In the thicker seams no brushing is necessary; although reducing the cost of development work, this removes a source of pack-wall and gobbing material. Although the main entries are often driven 12 ft. wide, yet seldom are they actually more than 6 or 8 ft. wide, the remaining 4 to 6 ft. being pack-walled and gobbed; the object of this is to remove as much coal as possible, and yet leave the roof fully supported. Such entries are called "gob-entries," and the pack-walls are on the sides opposite the rooms. The sides of the entries next the rooms, or the room ribs, are formed by vertical cuts made by hand (no blasting being done, to guard against weakening the pillars). Usually the airways and back entries are not brushed, as they are intended for air passages only.

When the pitch of the coal strata exceeds 6°, the rooms may be run diagonally, or both main entries and rooms may be run diagonally (an arrangement usually preferred with pitches of 25° and above, as the relation existing between the two openings is thus unaffected). Pitches of 1 to 10° are more common, in the fields so far developed, than higher ones; in fact, the inclination of the coal strata is often so moderate that rooms are turned off from both entries (main and back), thus changing the method of mining into a double-entry system. Such arrangement of rooms and entries is usually productive of extremely irregular mine workings, and is only locally employed.

The necks of rooms range from 8 to 10 ft. in width, and often maintain that width for distances of 12 to 15 ft. before being enlarged to the full breadth of the room. Room pillars range from 12 to 20 ft. in width.

The coal is won by vertical cuts, formed by hand, and is shot from the solid. The occurrence of shale partings in the coal necessitates mining the coal in benches. The usual method is to remove the upper bench by one or more holes placed above the parting; or, if the parting is hard and firm, by a shot placed in it. On removing the upper bench, the lower can readily be loosened by wedging, or by the use of small charges of powder. Occasionally the order of procedure given above is reversed; rooms may be worked by first removing the upper bench, while entries are driven by first removing the lower (of course, the conditions of the coal, roof, floor and partings are largely determinative of such work).

Hardsocg post and breast augers are largely used and range in size from 1¼ to 2 in. Black powder is employed, the quantity being varied to suit conditions. Wet slack is employed in tamping. It is commonly estimated that one keg (25 lb.) will loosen from 50,000 to 70,000 lb. of coal. Squibs and firing marrels, or needles, are usually employed in place of fuse.

Faults do not interfere much with the mining operations, owing to the very small number that have displacements exceeding 2 or 3 ft. But, occasionally, faults with displacements of 15 to 20 ft. are encountered, when the inconvenience, resulting from change of system of working and haulage, is considerable.

Much stripping is done; as there is considerable land available for this purpose, it promises to be, for some time to come, a cheap method of mining. During the past summer the Midland Coal Co. has opened strip-pits in the neighborhood of Midland and Burns. Several of these pits are ½ to ¾ mile long. The depth of cover removed varies from 8 to 12 or 14 ft. The cost of removing the cover ranged from 25 to 30c. per cu. yd. In one pit alone, $15,000 worth of coal has been stripped at a cost of about $3,000.

Timbering.—Native timber, such as

post-oak, is largely used in the mines for supports in stopes, room and entries. The sizes employed in the rooms are 6 and 8 in., round or split; they are spaced 4 to 6 ft. apart; while ¾-sets, composed of round or square timbers (6 to 8 by 8 to 10 in.) are usual. The sets are often spaced 18 in. to 3 ft. apart (depending on the condition of the roof); they are lagged with split or round poles. The lagging is often built into crib-work, and is wedged up to prevent loosening and settling of the roof.

Drainage.—As a rule the mines are rather wet; practically, pumping must be continuous. The water in many mines is quite acid, and therefore cannot be used in the boilers for steam production; but good water for boilers is usually available, and no serious inconvenience is experienced. The corrosion of the mine pumps and pipes is the most serious problem to be considered in connection with acid water. Canvas-belt pumps with wooden buckets are occasionally employed where the mine water is especially bad.

Sumps, 25 by 30 by 8 ft., are formed in the floor of the main entries, close to the slopes, near which the mine pumps are located and from which the water is ejected to the surface, either by way of the shaft or through bore-holes put down for that purpose. The disposition of the steam-supply pipe is similar to that of the discharge pipe for the water. Large steam pumps of the Snow, Worthington and Gardner makes are set permanently at the sumps; while smaller pumps (usually driven by compressed air or electricity) are placed in the slopes, being mounted on special trucks or in a mine car, which may be raised or lowered to suit the varying conditions of height of water, length of power and discharge pipes. The length of suction ranges from 50 to 150 ft., although the vertical lift seldom exceeds 8 to 10 ft. These small slope pumps discharge into the entry sumps located at higher levels. The suction and discharge of the large and small pumps are 2 and 4, and 3 and 5 in., respectively; occasionally a 6-in. suction with a 5-in. discharge is seen. Where the lay of the mine is irregular, it is often expedient to haul the water in tank-cars from certain wet places to the main sumps; or the cars may be hoisted to the surface.

Ventilation.—The coal mines of Arkansas (like those of the Indian Territory) are quite gaseous, thus requiring close attention to details of ventilation, and to the placing and firing of shots. However, as a rule, the mine atmosphere can be kept in good condition without difficulty, by properly arranged and operated mechanical ventilators. The exhaust system is that commonly employed in ventilation; it is, in fact, required by law. The slopes are down-casts; but the air-ways paralleling them are up-casts. The air currents entering the mines pass downward and laterally through the slopes and main entries; after traversing the workings, they return by the backways to the air-ways, and thence to the surface. An air-shaft, or up-cast, is sunk to one side of the mine opening (slope or shaft), and makes direct connection with the air-way on the side on which it is located; while connection is made with the air-way on the opposite side by a passage driven around or under the shaft or slope. This connecting passage must be driven horizontally or slightly to the rise.

ARRANGEMENT OF SLOPES, SHAFTS, ROOMS, ETC.

	Dimensions of Openings (in feet).					Distances, center to center (in feet).				
Mine.	Slope.	Shaft.	Main Entry.	Back Entry.	Airways.	Airways and Slopes.	Main Entry.	Main Entry and Back Entry.	Rooms.	Breakthroughs.
Spadra.....	5½x9	8x14 to 16	5½x12	3½ x 9	3½ x 9	24	162 L.150	21 to 24	45	40
Jenny Lind.....	7x12	8x14 to 16	5 to 7 x8 to 12	5 to 7x12	7x9 to 12	24 to 30	200 to 250 L.150 to 200	21 to 27	36 to 40	36 to 40
Midland	5½x9	.....	5½x9	4 x 9	4 x 9	24	200 L.150 to 155	21 to 24	33 to 36	36 to 40
Prairie Creek....	4x9	8x14 to 16	7x12	7 x 12	7x9 to 12	27 to 32	200 to 220 L.140 to 150	18 to 20	38 to 40	40
Coalhill....	5½x9	8x14 to 16	5½x9 to 12	3½ to 4x9 to 12	3½ x 9	21 to 25	162 L.150	21 to 25	50 to 52	60

L. is length of room.

Guibal fans (4 to 5 ft. width by 12 to 20 ft. diameter) are usually employed; they run at a speed of 65 to 70 r. p. m. A few Capell fans (9 ft. in diameter by 12 ft. wide) are being installed in several of the more modern mines. The engine speed of these fans is 114 r. p. m.; that of the fans is one-half greater. Special fans for ventilating underground engine rooms are common.

Mine Haulage.—This is done largely by mule power, although in a few of the new and recently equipped mines the third-rail system is now in use. Mules are employed in hauling cars from room entrances to slopes or partings adjacent to slopes, where "trips" are made up for slope haulage to the surface or to the foot of the shaft. Tail-rope and engine planes operate on the slopes. In the comparatively flat mines, two mules haul from 12 to 15 cars (the same number that is hauled on the slopes), while in the mines where the coal has steeper pitches the number of cars is reduced to 3 or 6, and the number of mules may be increased to 3 per trip, trail-teams being employed. In thin seams, cars are delivered to the room openings by mules, thence to the face by hand; while in the thicker seams they are hauled, one at a time, to the breast by mules. The cars have a capacity of 1,800 to 2,500 lb., and operate on tracks of 30- to 36-in. gauge. The weight of rails for slopes is 16 to 20 lb.; that for entries and rooms is 12 to 16 lb. Wooden (gum) rails (3 by 4 in. section) are largely used; on steep grades they are preferred to metal, as they increase the rolling friction of the cars. Cars are braked by spags, made of wood or metal.

In thinner seams, the cars are made with open ends in order to facilitate loading; rough walls, built up of the large pieces of coal, increase the capacity of the cars.

Rough and careless handling of cars on slopes and in entries causes much coal to be spilt, thus littering the haulageway and increasing the danger of derailment.

Preparation of Coal.—Although there is a wide range in the character of coal mined in Arkansas, yet the methods of preparing for market are quite similar, varying only in degree. In the anthracite district of Spadra and vicinity, the smaller sizes are the best sellers; while in the other districts, where soft coal is mined, considerably larger sizes are most in demand. Several modern breakers, modeled after those in the East, are in operation and building at Spadra and Coalhill. The handling of the coal in the breakers is wholly automatic; it is accomplished by belt conveyors, bucket elevators and box-car loaders. The coal is washed in jacketed screens or trommels. Balanced oscillating screens and gravity slate pickers are largely employed. The sizes commonly made are slack, pea, nut, egg, grate and stove. The softer coals are simply run over screens (grizzlies and perforated metal) in a manner similar to that in the bituminous coalfields. The sizes made are slack, nut, egg, fancy lump and lump. Mine-run is largely used by the railroads.

Equipment of Mines.—Taken as a whole, the equipment of Arkansas coal mines is not first-class, although quite a number of mines, modern in every respect, are in operation and their number is steadily increasing. Electric motors are slowly but surely taking the place of animal haulage, as also are electrically driven pumps replacing those driven by steam. A few coal-mining machines are also being used. Pumps driven by compressed air have also been used for some time. Ventilating fans of the Guibal and Capell types and of the latest design are taking the place of the older varieties of the Guibal make.

The extensive use of natural gas and crude oil for domestic use and steam production, in the districts tributary to the Arkansas coalfields, and which have hitherto drawn their supply of fuel from these mines, has seriously affected the market.

Indeed, so pronounced has been the falling off in demand for coal that many mines have been forced to shut down and to remain closed for 12 to 18 months. In certain localities such a period of enforced idleness means a permanent disablement of the mines, and with many ultimate abandonment resulting from caving of the workings. During the past six months considerable renewed activity has been evident, and the prospects are fair for resumption of operations under more favorable conditions of market and equipment.

Sulphur in Japan.

Sulphur is widely distributed in Japan, on account of the volcanic nature of the island, but is most actively mined in the north; it occurs generally in the vicinity of still active volcanoes. There are six principal mines, in order of importance: Imaonobori and Tsurugkisan in Hokkaido province, Skiranesan in Tochighi, and Yahukodoyama, Doro-in and Iwojima in Sahuma. The first two belong to the firm Mitsni Buyan Kaisha, of Tokio.

The country's output has grown from 10,000 tons in 1900 to above 20,000 tons in 1904, and is likely to grow still further. Domestic consumption takes only a quarter of the output, the consuming industries being the manufacture of matches, for which there are numerous plants, of explosives and of chemicals. As the price of sulphur advances, pyrite is being substituted, the supply of which comes mainly from Australia.

Exports amount to 14,000 or 15,000 tons per year, the western coast of the United States and Australia being the largest consumers; Hakodate is the usual shipping port, although Kobe and Nagasaki ship small quantities to China.

Recent quotations have been $17.50 per ton for the best grades and $15.50 for inferior grades, with variation of 50c. per ton according to method of packing.

In northern Japan, snow interrupts activities for five months in the year. The process of extraction is still primitive; the ore is put into iron receptacles and heated to 115° C. The Mitsui company, a few years ago, introduced modern Gill's furnaces such as are used in Sicily.

The yield of sulphur from Japanese ore is probably the highest in the world. It reaches 50% in the north, where ore of less than 38% is rejected. In Sicily, with modern furnaces, 20% ore is considered workable.

At Binangonan, according to a recent Government Report on the Mineral Resources of the Philippine Islands, there occurs a limestone which is shown by analysis to be suitable for making cement. As there is available clay in the vicinity and good water transportation to Manila, capitalists are considering the erection at the latter place of a modern rotary-kiln cement plant, to cost not less than $225,000.

Colorimetric Estimation of Selenium.*

BY J. E. CLENNELL.†

The following method is available for the rapid approximate estimation of small quantities of selenium in ores, bullion, smelting-room products, zinc-gold precipitates, cyanide solutions, etc., with the necessary modifications in each case.

The element must first be obtained in solution, preferably as a selenite or selenocyanate. In many cases this may be done by treatment, first with concentrated nitric acid and afterward with hydrochloric acid; by digestion on a water-table, all free chlorine is expelled. It may sometimes be necessary to filter the solution after this treatment before proceeding to apply the test for selenium; but, if the composition of the substance to be tested is approximately known, the presence of a moderate amount of a white precipitate (*e. g.*, sulphate, silver chloride, zinc ferrocyanide, calcium sulphate, etc.) is of no consequence, as its effect can be imitated by preparing a "check" of similar composition.

Having prepared the solution as above, the liquid, or a measured fraction of it, is heated to boiling, with the addition of a few c.c. of a concentrated (say, 5%) solution of sodium bisulphite. In the case of cyanide solutions, as generally obtained, no preliminary operation in ore treatment is necessary. One hundred c.c. of the cyanide solution is mixed with 10 c.c. concentrated hydrochloric acid; heated to boiling; and the boiling continued for about 5 minutes, by which time the selenium is generally precipitated completely; it is usually unnecessary in this case to add the bisulphite. The finely divided selenium remains in suspension for some time, imparting to the mixture a tint varying, according to the conditions, from light orange to bright scarlet. The mixture is then transferred to a suitable vessel, made up to a definite volume, and the tint compared with that of a freshly prepared standard, of approximate composition.

The Standard Selenium Solution.—This is prepared by agitating 100 m. of pure selenium with a slight excess of concentrated bromine-water, in a stoppered bottle, until it is dissolved, and adding sodium bicarbonate, in small quantities at a time, until a colorless liquid is obtained. This is then made up to a liter. For some purposes it is convenient to prepare a standard of 1-10 this strength.

Checks.—These are made by boiling measured volumes of the standard selenium solution with 5 or 10 c.c. of the bisulphite (5% $NaHSO_3$), and making up to the same volume as the liquid whose tint is to be compared, adding such ingredients as may be necessary to obtain the same kind of color. In the case of working cyanide solutions, a fairly close imitation of the tint is obtained by adding a mixture of one volume of potassium ferrocyanide with 5 volumes of zinc chloride solution equivalent in strength to the ferrocyanide. When the composition of the solution is approximately known, it is a good plan to prepare a "model solution" containing the same essential ingredients, but of double the strength. Take 50 c.c. of this model solution, add a measured volume of the standard selenium, 10 c.c. concentrated hydrochloric acid, and 5 c.c. of the 5% bisulphite; make up to 110 c.c., and at the same time, in another flask, take 100 c.c. of the cyanide liquor to be tested, together with 10 c.c. concentrated hydrochloric acid. Heat both liquids to boiling, and continue boiling for the same length of time and under similar conditions. The boiling should not be continued too long or the selenium will be precipitated in a dense form and nearly black in color; in this case no colorimetric test can be applied.

When the proper conditions are observed, about 0.5 m. of selenium imparts a distinct color to 100 c.c. of the liquid without concentration. By concentrating to 20 c.c. before applying the test, it is easy to observe the tint given by 0.1 milligram.

Usually a series of checks are prepared at the same time, differing from one another by 0.5 mg. of selenium; say 0.5, 1.0, 1.5, 2.0, 2.5 and 3.0 mg.; the tint of the solution to be analyzed is compared with that of the standard which most resembles it. It is thus possible to detect, and approximately estimate, 1 part of selenium in 20,000 of liquid; and, by concentrating 100 c.c. to 20 c.c. before making the test, it is possible to determine 1 part in 100,000.

The only element that interferes (under ordinary conditions) is copper. In some cases this may be precipitated as ferrocyanide, giving a color, when mixed with zinc ferrocyanide, which more or less resembles that given by selenium, and of course entirely vitiating the test.

By this method an approximate determination of selenium in most cases can be made in one or two hours, and if the standards are already prepared and the selenium is in solution as selenite or selenocyanate, the test may be made in 15 minutes—a great advantage when it is considered that the usual gravimetric method requires 48 hours for the settling of the precipitate.

*Supplementary to "Estimation of the Chief Constituents in Cyanide Solution," this JOURNAL, June 29, 1905, p. 1230.

†Cyanide chemist to the M. M. Redjang Lebong, Benkoelen, Sumatra.

The iron furnaces of the United States annually produce gas sufficient to generate over 1,000,000 h.p., which could be utilized in furnishing electricity for industrial purposes. Some of this gas is now used in gas engines for driving the machinery in iron and steel works.

The Blue Tier Tinfield.

The Blue Tier is a granite range in the northeastern part of Tasmania, between the Ringarooma river and the east coast line. It has long been celebrated for its extensive low-grade tin deposits. According to W. H. Twelvetrees, the Government geologist, who investigated the district in 1901, the Tier granite, with textural and mineralogical variations, is the basement rock of the whole east coast of Tasmania. At the Tier it is a rather coarse-grained porphyritic granite, with large crystals of feldspar—gray, white or pink in color—scattered through it. Its mineral constituents are feldspar, quartz, biotite and a little muscovite. Sometimes the white mica is quite absent; its abundance seems to depend upon the presence of tin ore.

The quality of the tin ore from the Blue Tier mines is good. The ore is remarkably free from iron; in some of it, however, traces of copper are present. There seems to be no rule for the distribution of ore tin in the granite. The patches are irregular, and will, probably, be found to be more dependent upon the natural fissuring of the rock than upon any law of segregation. Taking the formation as a whole, the probabilities are that the ore content will range from three-eighths to about five-eighths of 1% cassiterite.

The principal companies operating at present are the Anchor and the Australian. Attention is being given to the field by the decision of the directors of the Mount Lyell Company to secure leases on tin properties in the Blue Tier.

The Wedding zirconium lamp has a filament composed of the oxides of zirconium and magnesium, mixed with cellulose, and "squirted" into a thread, which is subsequently carbonized in an atmosphere of oxygen. A pound of zirconium will supply sufficient material for the filaments of 50,000 lamps. The lamps consume two watts per candle power and have a life of 800 hours.

The Carmichael-Bradford Process.

As described in United States patent No. 705,904, issued July 29, 1902, lead sulphide ore is mixed with 10 to 35% of calcium sulphate, the percentage varying according to the grade of the ore. The mixture is charged into a converter and gradually heated externally until the lower portion of the charge, say one-third to one-fourth, is raised to a dull-red heat; or the reactions may be started by throwing into the empty converter a shovelful of glowing coal and turning on a blast of air sufficient to keep the coal burning and then feeding the charge on top of the coal. This heating effects a reaction whereby the lead sulphide of the ore is oxidized to sulphate and the calcium sulphate is reduced to sulphide. The heated mixture being continuously subjected to the blast of air, the calcium sulphide is re-oxidized to sulphate and is thus regenerated for further use. This reaction is exothermic, and sufficient heat is developed to complete the desulphurization of the charge of ore by the concurrent reactions between the lead sulphate (produced by the calcium sulphate) and portions of undecomposed ore, sulphurous anhydride being thus evolved. The various reactions, which are complicated in their nature, continue until the temperature of the charge reaches a maximum, by which time the charge has shrunk considerably in volume and has a tendency to become pasty. This becomes more marked as the production of lead oxide increases; and as the desired point of desulphurization is attained the mixture fuses; at this stage the calcium sulphide which is produced from the sulphate cannot readily oxidize, owing to the difficulty of coming into actual contact with the air in the pasty mass, but, being subjected to the strong oxidizing effect of the metallic oxide, it is converted into calcium plumbate, while sulphurous anhydride is set free. The mass then cools, as the exothermic reactions cease, and can be readily removed to a blast-furnace for smelting.

The reactions above described are as outlined in the original American patent specification. Irrespective of their accuracy, the Carmichael-Bradford process is obviously quite similar to the Huntington-Heberlein, and doubtless owes its origin to the latter. The difference between them is that in the Huntington-Heberlein process the ore is first partially roasted with addition of lime, and is then converted in a special vessel. In the Carmichael-Bradford process the ore is mixed with gypsum and is then converted directly. The greatest claim for originality in the Carmichael-Bradford process may be considered to lie in it as a method of cheaply desulphurizing gypsum, inasmuch as not only is the sulphur of the ore expelled, but also the sulphur of the gypsum; and the sulphur is driven off as a gas of sufficiently high tenor of sulphur dioxide to enable sulphuric acid to be made from it economically. Up to the present time the Carmichael-Bradford process has been put into practical use only at Broken Hill, N. S. W.

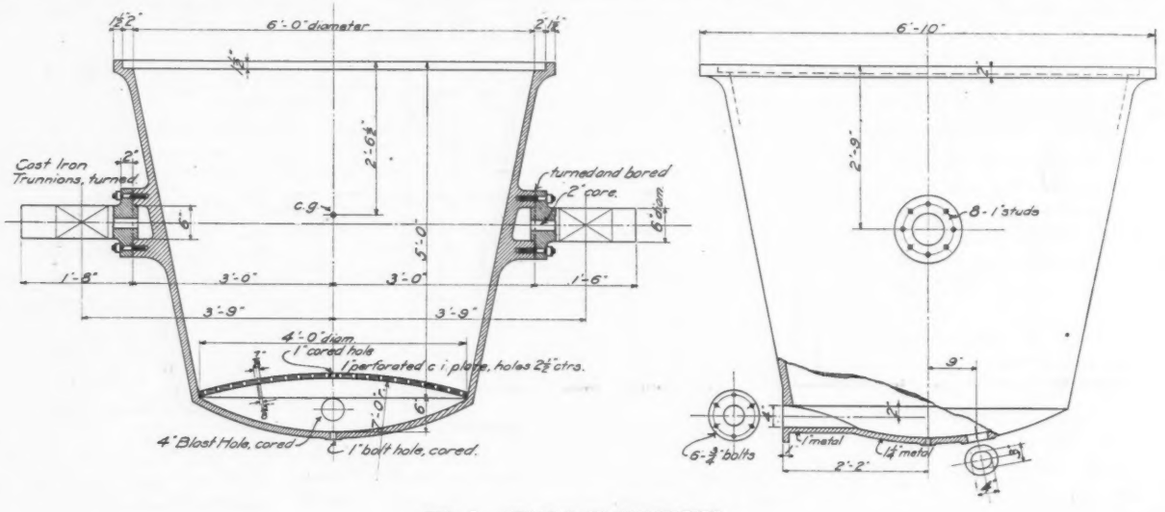


FIG. I. DETAILS OF CONVERTERS.

The Broken Hill Proprietary Company first conducted a series of tests in a converter capable of treating a charge of 20 cwt. These tests were made at the smelting works at Port Pirie. Exhaustive experiments made on various classes of ores satisfactorily proved the general efficacy of the process. The following ores were tried in these preliminary experiments, viz.:

First-grade concentrate containing: Pb, 60%; Zn, 10%; S, 16%; Ag, 30 oz.

Second-grade concentrate containing: Pb, 45%; Zn, 12.5%; S, 14.5%; Ag, 22 oz.

Slime containing: Pb, 21%; Zn, 17%; S, 13%; Ag, 18 oz.

Lead-copper matter containing: Fe, 42%; Pb, 17%; Zn, 133%; Cu, 2.4%; S, 23%; Ag, 25 oz.

Other mattes, of varying composition up to 45% Pb and 100 oz. Ag, were also tried.

The results from these preliminary tests were so gratifying that a further set of tests was made on lead-zinc slime, with

a view of ascertaining whether any volatilization losses occurred during the desulphurization. This particular material was chosen because of its accumulation in large proportions at the mine, and the unsatisfactory result of the heap roasting which has recently been practiced. The heap roasting, although affording a product containing only 7% S, which is delivered in lump form and therefore quite suitable for smelting, resulted in a high loss of metal by volatilization (17% Pb, 5% Ag).

The result of nine charges of the slime treated by the Carmichael-Bradford process was as follows:

	cwt.	Assays. Pb %	Ag oz.	Zn %	S %	Contents. Pb cwt.	Ag oz.	Zn cwt.	S cwt.
Raw slime	128.1	21.3	18.0	16.8	13.1	27.28	115.3	25.2	16.78
Raw Gypsum	54.9								9.88
Total	183.0					27.28	115.3	25.2	26.66
Sintered material	109.88	20.7	17.2	.....	4.80	22.74	94.5	.....	5.27
Middling	14.47	17.7	15.7	.....	6.20	2.56	11.3	.....	0.89
Fines	11.12	19.0	14.8	.....	7.50	2.11	8.2	.....	0.83
Total	135.47				5.17	27.41	113.0		6.99

These results indicated practically no volatilization of lead and silver during the treatment, the lead showing a slight increase, viz.: 0.47%, and the silver 1.13% loss. A desulphurization of 70.4% was effected. A higher desulphurization could have been effected had this been desired. In the above tabulated results, the term "middling" is applied to the loose fritted lumps lying on the top of the charge: these are suitable for smelting, the fines being the only portion which has to be returned.

In order to test the practicability of making sulphuric acid, a plant consisting of three large converters of capacity of five tons each, together with a lead chamber 100 ft. by 20 ft. by 20 ft. was then erected at Broken Hill, together with a dehydrating furnace, pug mill and granulator. These converters are shown in the accompanying engravings.

A trial run was made with 108 tons of concentrate of the following composition: 54% lead; 1.9% iron; 0.9% manganese; 9.4% zinc; 14.6% sulphur; 19.2% insoluble residue, and 24 oz. silver per ton.

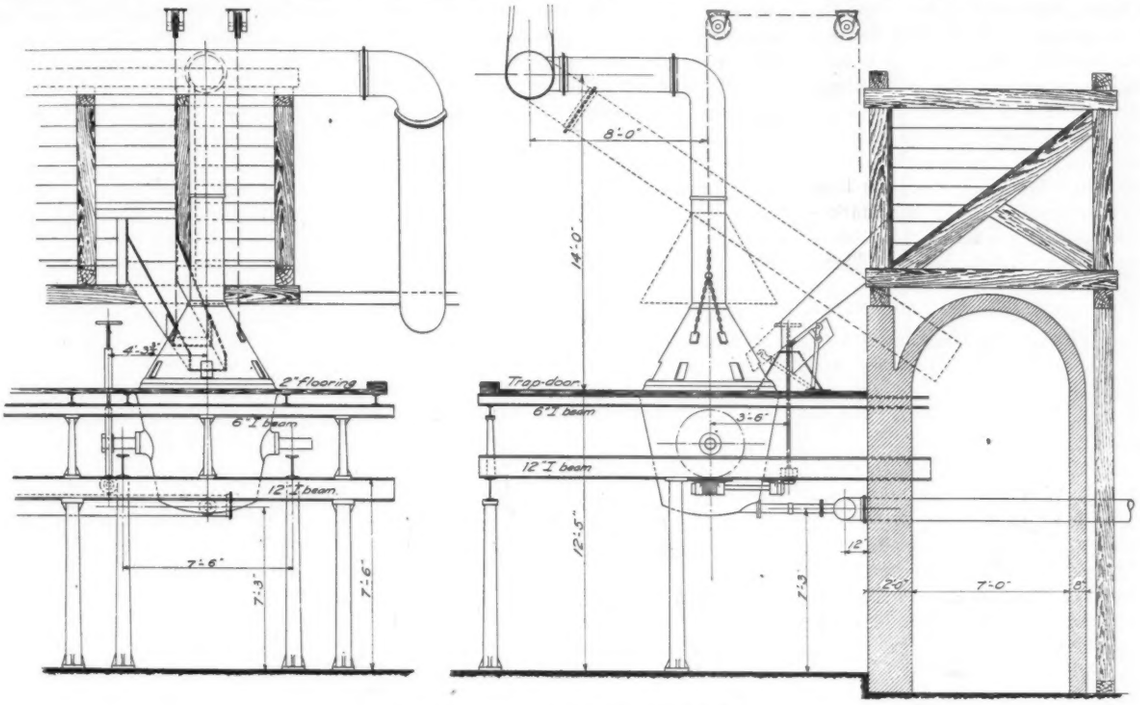


FIG. 2. ARRANGEMENT OF CONVERTERS.

The converter charge consisted of 100 parts of the concentrate and 25 parts of raw gypsum, crushed to pass a 1-in. hole and retained by a 0.25-in. hole, the material finer than 0.25 in. (which amounted to 5% of the total) being returned to the pug mill. After desulphurization in the converter, the product assayed as follows: 48.9% lead; 1.80% iron; 0.80% managanese; 7.87% zinc; 3.90% sulphur; 1.02% alumina; 5.80% lime; 21.75% insoluble residue; 8.16% undetermined, oxygen as oxides, sulphates, etc.; total, 100%. Its silver content was 22 oz. per ton. The desulphurized ore weighed 10% more than the raw concentrate. During this run 34 tons of acid were made.

A trial was then made on 75 tons of slime of the following composition: 18.0% lead; 16.6% zinc; 6.0% iron; 2.5% manganese; 3.2% alumina; 2.1% lime; 38.5% insoluble residue; total, 100%. Its silver content was 19.2 oz. per ton.

The converter charge in this case consisted of 100 parts of raw slime and 30 parts of gypsum. The converted material assayed as follows: 16.1% lead; 14.0% zinc; 3.6% sulphur; 5.42% iron; 2.25% manganese; 4.10% alumina; 8.60% lime; 39.80% insoluble residue; 6.13% undertermined (oxygen, etc.); total, 100%; and silver, 17.5 oz. per ton. The increase in weight of desulphurized ore over that of the raw ore was 11%. During this run 22 tons of acid were manufactured.

The analysis of the gypsum used in each of the above tests (at Broken Hill) was as follows: 76.1% $CaSO_4$, $2H_2O$; 0.5% Fe_2O_3; 4.5% Al_2O_3; 18.9% insoluble residue.

The plant was then put into continuous operation on a mixture of three parts slime and one of concentrate, desulphurizing down to 4% S, and supplying 20 tons of acid per week, and additions were made to the plant as soon as possible. The acid made at Broken Hill has been used in connection with the Delprat process for the concentration of the zinc tailing. At Port Pirie, works are being erected with capacity for desulphurization of about 35,000 tons per annum, with an acid output of 10,000 tons. This acid is to be utilized for the acidulation of phosphate rock.

The cost of desulphurization of a ton of galena concentrate by the Carmichael-Bradford process, based on labor at $1.80

per 8 hours, gypsum at $2.40 per 2,240 lb., and coal at $8.40 per 2,240 lb., is estimated as follows:

0.25 ton of gypsum	$0.60
Dehydrating and granulating gypsum	.48
Drying mixture of ore and gypsum	.12
Converting	.24
Spalling sintered material	.12
0.01 ton coal	.08
Total	$1.64

The lime in the sintered product is credited at 12c., making the net cost $1.52 per ton of ore.

The plant required for the Carmichael-Bradford process can be described with sufficient clearness without drawings, except the converters. The ore (concentrate, slime, etc.) to be desulphurized is delivered at the top of the mill by cars, conveyors, or other convenient means, and dumped into a bin. Two screw feeders placed inside the bin supply the mill with ore, uniformly and as fast as it is required. These feeders deliver the ore into a chute, which directs it into a vertical dry mixer.

A small bin, on the same level as the ore-bin, receives the crude gypsum from cars. Thence it is fed automatically to a disentegrator, which pulverizes it finely and delivers it into a storage bin underneath. This disentegrator revolves at about 1,700 r. p. m. and requires about 10 h. p. The body of the machine is cast iron, fitted with renewable wearing plates (made of hard iron) in the grinding chamber. The revolving parts consist of a malleable iron disc in which are fixed steel beaters, faced on the grinding surface with highly tempered steel. The bin which receives the floured gypsum contains a screw conveyor similar to those in the ore-bin, and dumps the material into push conveyors built into the dehydrating furnace. They carry the crushed gypsum along at a speed of about 1 ft. per minute, and allow about 20 ft. to dehydrate the gypsum. This speed can be, of course, regulated to suit requirements.

The dehydrated gypsum runs down a chute into an elevator boot, and is elevated into a bin which is on the same level as the ore-bin. This bin also contains a screw conveyor, like that in the ore-bin. The speed of delivery is regulated to deliver the right proportion of dehydrated gypsum to the mixer.

The mixer is of the vertical pattern and receives the sulphide ore and dehydrated gypsum from the screw feeders. In it are set two flat revolving cones running at different speeds, thus ensuring a thorough mixture of the gypsum and ore. The mixed material drops from the cones upon two baffle plates, and is wetted just before entering the pug-mill. The pug-mill is a wrought-iron cylinder of ¼-in. plate about 2 ft. 6 in. diameter and 6 or 8 ft. long, and has the mixer fitted to the head. It contains a 3-ft. wrought-iron spiral with propelling blades, which forces the plastic mixture through ¾-in. holes in the cover. The material comes out in long cylindrical pieces, but is broken up and formed into marble-shaped pieces on dropping into a revolving trommel.

The trommel is about 5 ft. long, 2 ft. in diameter at the small end and about 4 ft. at the large end. It revolves about a wrought-iron spindle (2½ in. diameter) carrying two cast-iron hubs to which are fitted arms for carrying the conical plate ⅛ in. thick. About 18 in. of the small end of the cone is fitted with wire gauze, so as to prevent the material as it comes out of the pug mill from sticking to it. The trommel is driven by bevel gearing at 20 to 25 r. p. m. The granulated material formed in the trommel is delivered upon a drying conveyor.

The conveyor consists of a hinged wrought-iron plate flanged at the side to keep the material from running off. It is driven from the head by gearing, at a speed of 1 ft. per minute, passing through a furnace 10 ft. long to dry and set the granules of ore and gypsum. This speed can, of course, be regulated to suit requirements. The granulated material, after leaving the furnace, is delivered to a single-chain elevator, traveling at about 150 ft. per min. It drops the material into a grasshopper conveyor, driven by an eccentric, which distributes the material over the length of a storage bin. From this bin the material is directed into the converters by means of the chutes, which have their bottom ends hinged so as to allow for the raising of the hood when charging the converters.

The converters are shown in the accompanying engravings, but they may be of slightly different form from what is shown therein, *i. e.*, they may be more conical than spherical. They will have a capacity of about four tons, being 6 ft. in diameter at the top, 4 ft. in diameter at the false bottom, and about 5 ft. deep. They are swung on cast-iron trunnions bolted to the body and fitted by means of a hand-wheel and worm (not shown). They are carried on strong cast-iron standards fitted with bearings for trunnions, and all necessary brackets for tilting gear. The hood has a telescopic funnel which allows it to be raised or lowered, weights being used to balance it. At the apex of the cone a damper is provided to regulate the draught. A 4-in. hole in the pot allows the air from the blast pipe, 18 in. in diameter, to enter under false perforated bottom, the connection between the two being made by a flexible pipe and coupling. Two Baker blowers supply the blast for the converters. The material, after being sintered, is tipped on the floor in front of the converters and is there broken up to any suitable size, and thence dispatched to the smelters.

The necessary power for a plant of capacity of 150 tons of ore per day will be supplied by a 50-h.p. engine.

Coal in Manchuria.

According to L. Pervinquiere, the coal seams near Mukden, in Manchuria, are intercalated among grits and shales. Small coal basins are fairly numerous in the Liaotung peninsula; as at Wuhoshin, on Society bay, where several seams, varying from 3 to 13 ft. in thickness, of friable coal have been worked; at Talienwan; at Saimaki, on the Korean frontier, where a seam (3 to 5 ft. thick) of crumbly bituminous coal occurs. At Pönnhsihu, southeast of Mukden, five or six seams of coal, each 1 or 2 ft. thick, have been proved; the conditions appear favorable for working, but the strata are much faulted. The mineral is friable, though not specially bituminous, and yields coke of middling quality. None of these coals are suitable for naval purposes or for locomotives, nor would it pay to export them. Good anthracite, however, has been found in Liaohsi.

In northern Manchuria the true coal measures are not so well developed, but coal seams of later age (Triassic, Jurassic and Tertiary) crop out at several localities in the upper Sungari valley, in the neighborhood of Kirin, in the Argun valley, where there is a thick seam of lignite.

It is expected that the coal-mining industries will witness a great expansion during the next few years. Japanese companies are planning to open up a number of new mines, and experiments are being made with washing plants, with the view of improving the quality of the product of existing mines. Railroad connections with the coalfields will be largely extended.

Standardization of Ferrocyanide Solutions with Respect to Zinc.*

BY E. M. JOHNSON.†

While there are a number of causes for the variations in the determinations of zinc, such as the impurity of chemicals, amount of acid, volume, temperature and slow end reaction, I am satisfied that part of the differences may be accounted for in the determination of the correct value of the standard. In the past eight months I have made up about 20 solutions of ferrocyanide, and standardized with varying amounts of zinc, from 10 mg. to 250 mg., and where the solution was 0.01 for 250 mg. of zinc, it was practically 0.0092 for 10 mg. All determinations have been made under the same conditions.

I am satisfied that some chemists disregard the blank entirely, assuming that if the solution be standardized under the same conditions as the determinations are made the factor will be correct, but this is an oversight, as the solution is not standardized under the same conditions unless the same amount of zinc be used.

*Abstract of a paper in *Western Chemist and Metallurgist*, June, 1905, I, v, 148-151.

†Canon City, Colo.

On the other hand, some chemists disregard the blank in standardizing, but allow for it in the determination; both of the above conditions are of course incorrect.

For instance, if an ore carrying 10% of zinc be titrated with the same solution that has been standardized against 250 mg. of zinc, the result will be 0.8 too high. In fact, I do not see how a direct reading solution can be adopted for all amounts of zinc.

To avoid the necessity of multiplying by an uneven factor, I believe a table or curve can be constructed, in which the readings of the burette will correspond to percentages. In the same way I should think a table could be constructed, with reference to copper, when the potassium cyanide method is used, as shown herewith.

STANDARDS FOR VARIABLE AMOUNTS OF ZINC.

E. M. Johnson.			W. G. Martin.		
Mg. Zinc.	Constant.	Av. Constant.	Mg. Zinc.	Constant.	Av. Constant.
10.0.....	.0077				
10.0.....	.0096				
10.0.....	.0077		15.0.....	.0088	
10.0.....	.0077	.0077	15.0.....	.0084	
20.2.....	.0088		15.0.....	.0084	.0085
20.0.....	.0088	.0088			
30.0.....	.0086		25.0.....	.0089	
30.3.....	.0092		25.0.....	.0089	
30.0.....	.0086		25.0.....	.0093	.0090
30.0.....	.0093	.00894	40.0.....	.0093	
40.1.....	.0091		40.0.....	.0093	
40.0.....	.0093	.0092	40.0.....	.0091	.0092
50.0.....	.00920				
50.0.....	.00923				
50.0.....	.0092				
50.0.....	.0092		75.0.....	.0096	
50.0.. ...	.0093		75.0.....	.0096	
50.0.....	.0094		75.0.....	.0096	.0096
50.0.....	.00927		100.0.....	.0098	
50.0.....	.00935		100.0.....	.0098	.0098
50.0.....	.0092	.00924			
150.0.....	.0098				
150.0.....	.0098				
150.0.....	.0098				
150.0.....	.0098				
150.0.....	.0098				
159.4.....	.00984				
150.9.....	.00983		150.0.....	.00993	
151.2.....	.00982	.0098	150.0.....	.00987	.0099
250.0.....	.00997				
250.0.....	.0100				
250.0.....	.0100				
250.0.....	.01009				
250.0.....	.00997				
250.0.....	.0100		250.0.....	.01000	.01002
250.0.....	.0100		250.0.....	.01004	
250.0.....	.0100		250.0	.01000	.01002
250.3.....	.00999		350.0.....	.01009	
250.3.....	.01001	.01	350.0.....	01012	.0101

VARIATIONS, FROM WHICH A TABLE COULD PROBABLY BE CONSTRUCTED.

No. c.c.	Constant.	Difference for 5 c.c.	Difference for $\frac{1}{10}$ c.c.
5	.0092	.....	.....
10	.0096	.0004	.000008
15	.0098	.0002	.000004
20	.0099	.0001	.000002
25	.01	.0001	.000002

According to H. D. McCaskey, of the Mining Bureau, Philippine Islands, platinum has been discovered in small quantity in the placer sands from Rizal.

The officials of the Mining Bureau, Philippine Islands, report that excellent coal, suitable for steamer use, is found in Albay province, in Batan island. In Cebu are important deposits of steaming coal and two known deposits of lead ores. These coals have been proved by practical tests on Philippine steamships to do very well.

Lead-Smelting at Monteponi, Sardinia.*

BY ERMINIO FERRARIS.†

In dressing mixed lead and zinc carbonate ores by the old method of gradual crushing with rolls, middling products were obtained, which could be further separated only with much loss. Inasmuch as the losses in the metallurgical treatment of such mixed ore were reckoned to be less than in ore dressing, these between-products at Monteponi were saved for a number of years, until there should be enough raw material to warrant the erection of a small lead and zinc smeltery.

In 1894 the lead smeltery in Monteponi was put in operation; in 1899 the zinc smeltery was started. At about the same time the reserves of lead ore were exhausted, and the lead plant then began to treat all the Monteponi ores and a part of those from the neighboring mines.

As will be seen from the plan (Fig. 1), the smelting works cluster in terraces around the mine shaft, covering an area of about 3,000 sq. m. (0.75 acre); the ore stocks and the pottery of the zinc works are located in separate buildings.

During the first years of working, the slag had purposely been kept very rich in zinc, in the hope of utilizing it later for the production of zinc oxide. It had an average zinc content of 16.80%, or 21% of zinc oxide, with about 32% SiO_2, 25% FeO and 14% lime. According to the recent experiments, this slag can very well be used for oxide manufacture, in connection with calamine rich in iron. The slag made at the present time has only 15% ZnO; 25% SiO_2; 16% CaO; 3% MgO; 33% FeO; 2.5% Al_2O_3, and 2% BaO, and small quantities of alkali, sulphur and lead (1 to 1.5 per cent).

The following classes of ore are produced at Monteponi:

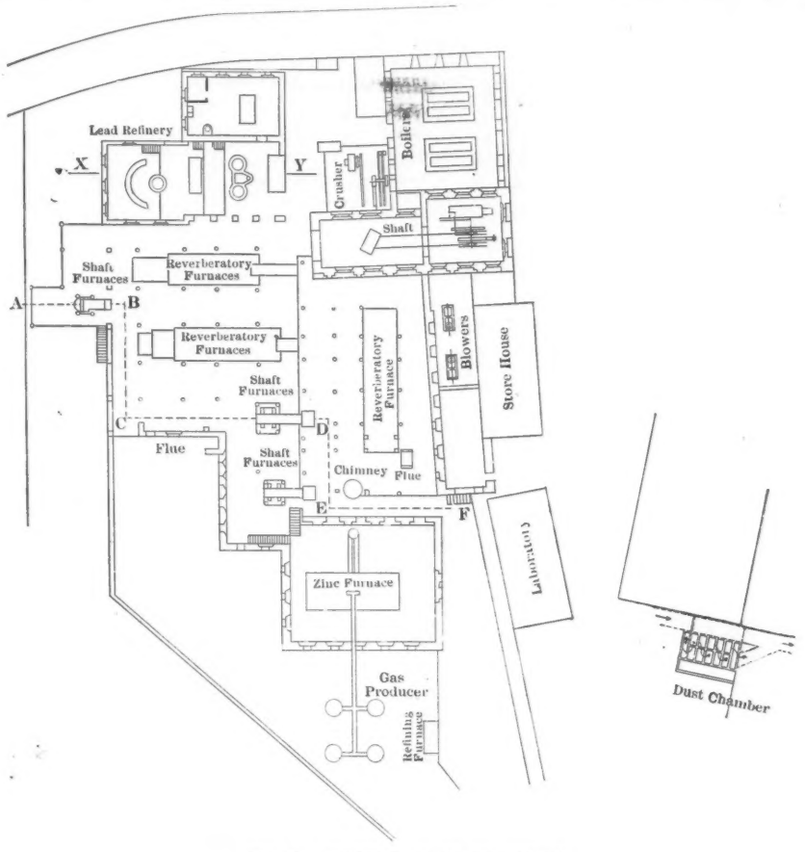


FIG. 1. GENERAL PLAN OF WORKS.

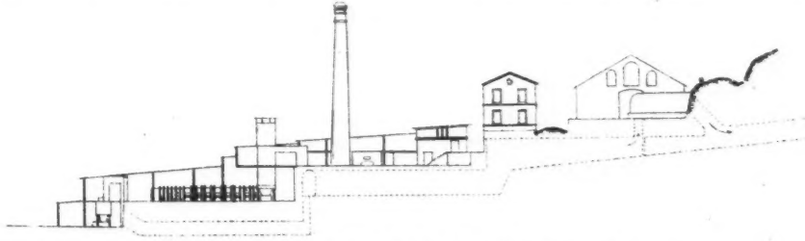


FIG. 2. ELEVATION OF WORKS ON LINE A B C D E F OF FIG. 1.

*Translated from *Oest. Zeit. f. Berg-und Hüttenwesen*, 1905, p. 455.

†Director-general of the Societa di Monteponi.

1. Lead carbonates, with a little zinc oxide; these ores are screened down to 10 mm. The portion held back by the screen is sent straight to the shaft-furnaces; the portion passing through is either roasted together with lead sulphides, or is sintered by itself, according to circumstances.

2. Dry lead ores, mostly quartz, with 10 to 15% lead, which are mixed for smelting with the lead carbonates.

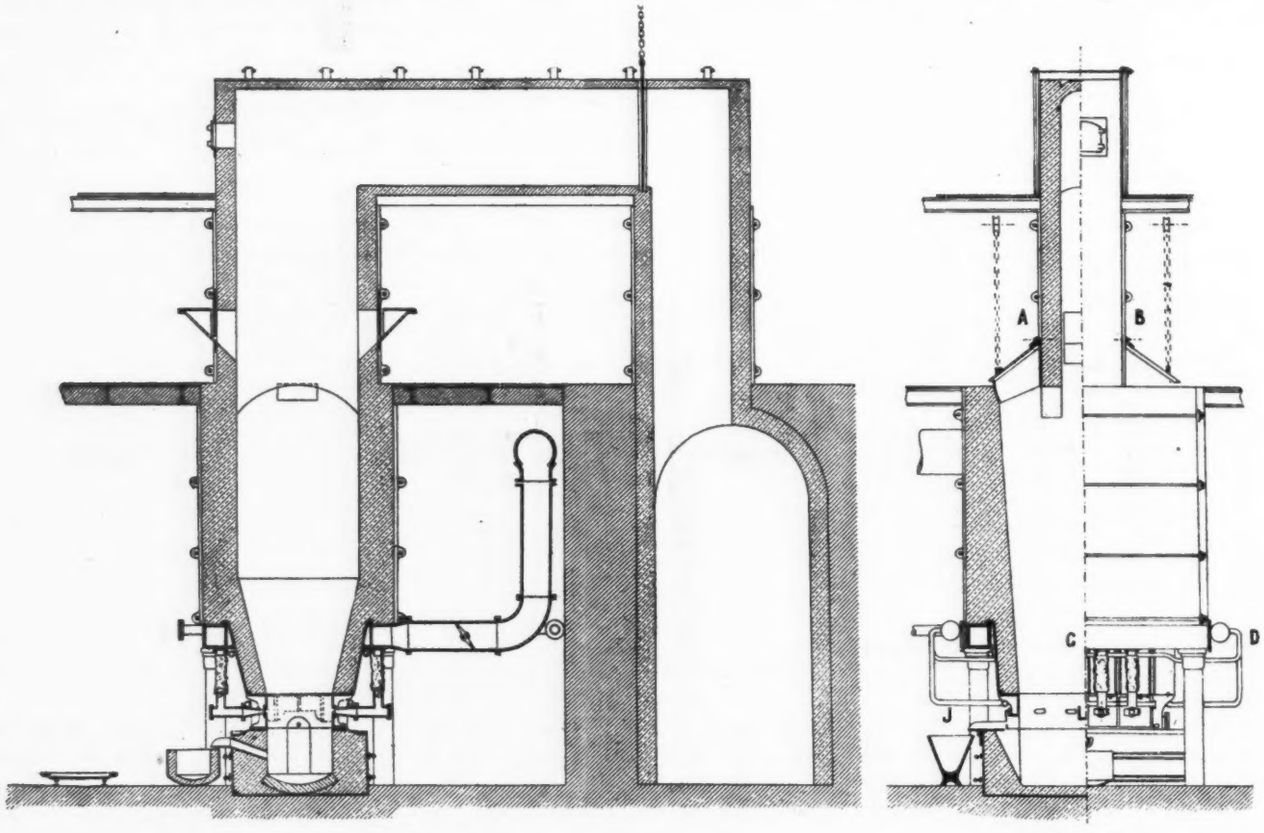
3. Lead sulphides, which are crushed fine and roasted dead. Quartz sand is added in the roasting, in order to decompose the lead sulphate and produce a readily fusible silicate; as quartz flux, fine sand from the dunes on the coast is used. This is a product of decomposition of trachyte, and contains 88% of silica, together with alkali and alumina. The roast is effected in two hand-raked reverberatory furnaces, 18 m. long, which turn out 12,000 kg. of roasted ore in 24 hours, consuming 1,800 kg. of English cannel coal, or 2,400 kg. of Sardinian lignite. There is also a third reverberatory furnace, provided with a fusion chamber, which is used for roasting matte and for liquating various secondary products.

The charge for the shaft-furnace, as a rule, consists of 50% ore (crude and roasted), 20% fluxes and 30% slag of suitable origin. The fluxes used are limestone from the mine, containing 98% $CaCo_3$, and limonite from the calamine deposits. This iron ore contains 48% Fe, not more than 4% Zn, a little lead and traces of copper and silver.

A shaft-furnace will work up a charge of 60 tons, equal to 30 tons of ore, in 24 hours, with a coke consumption of 12% of the weight of the charge, and a blast pressure of 50 mm. of mercury. There are three furnaces, of which two are used alternately for smelting lead ores, while one smaller furnace serves for smelting down products, such as hard lead, copper matte and copper bottoms.

Figs. 2 to 5 show one of the furnaces. It will be seen at once that its construction is similar to that of the standard American furnaces. Pilz furnaces were tried in the first few years, but were finally abandoned, as they could not be kept running for any satisfactory length of time with slags rich in zinc. Diluting the slag, on the other hand, would have led to an increased coke consumption, and would have rendered the slag itself worthless. The furnace, however, differs in several respects from its American prototype; the following are some of the chief characteristics peculiar to it.

The chimney above the feed-floor covers one-third of the furnace shaft, and is turned down in the form of a syphon, to connect with the flue-dust chamber. The lateral faces, which are left open, serve as charging apertures; the central one of these, provided with a counter-balanced sheet-iron door, is used for charging from cars. The square openings at the ends, which are covered with cast-iron plates, are used for barring down the furnace shaft and may also be used for charging. By this arrangement, together with the two hoppers placed laterally on the chimney, it is possible to distribute the charge in any desired manner over the whole cross-section of the furnace. This arrangement greatly facilitates the removal of any accretions in the furnace shaft, as the centrally placed chimney catches all the smoke, while the charge-holes render the furnace accessible on all sides. In case of large accretions being formed, the whole furnace can be emptied, cleaned and restarted in 24 to 36 hours.

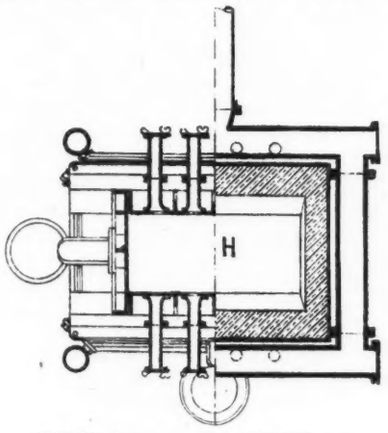


SECTION E F. SECTION G H.

FIG. 3. SHAFT-FURNACE FOR LEAD SMELTING.

The smelting zone is enclosed by cast-steel plates 50 cm. high, instead of having a water jacket. These are cooled as desired by turning a jet of water on them. The plates are connected to the furnace shaft by a bosh wall 25 cm. thick, which is surrounded with a boiler-plate jacket. These jacket plates also are cooled from the outside by sprays of water. With this arrangement the consumption of water is less than with water jackets, as a part of the water is vaporized, and the danger of leakage of the jackets is avoided. The cast-steel plates are made in two patterns; there are two similar side-plates, each with four slits for the tuyeres, and two end-plates, provided with a circular

breast of 30 cm. aperture, for tapping the slag. The breast is cooled by water flowing down, and is closed in front by a plate



SECTION J L. SECTION C D.

FIG. 4. SHAFT-FURNACE.

of sheet iron, in which is the tap-hole for running off the slag. When cleaning out, this sheet-iron plate is removed and the breast is opened, thus providing easy access to the hearth. The four cast-steel plates are anchored together with bolts at

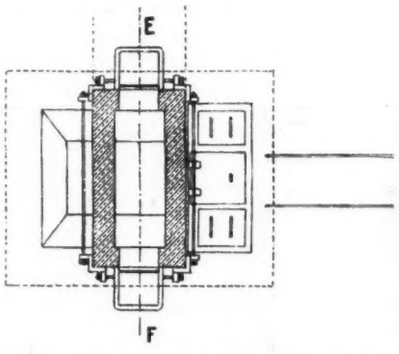


FIG. 5. SHAFT-FURNACE FOR LEAD SMELTING. SECTION A B.

their outer ribs, and rest on two long, gutter-shaped pieces of sheet iron, which carry off all the water which flows down, and keep it away from the brickwork of the Tiegel hearth.

The hearth, cased with boiler plate and rails, has at the side a cast-iron pipe of 10 cm. diameter for drawing off the lead to the outside kettle; this pipe has a slight downward inclination, to prevent the slag flowing out; every 20 minutes lead is tapped, and the end of the pipe is then plugged up with clay.

The furnace-shaft is supported upon a hollow mantel, which serves at the same time as blast pipe. The blast pipe has eight lateral tees, which are connected by canvas hose with the eight tuyeres. The mouth of the tuyeres has the form of a horizontal slit, whereby the air is distributed more evenly over the entire zone of fusion

The precipitation of flue dust is effected in a brick condensing chamber, placed near the beginning of the main flue. The main flue terminates on the hill (see Fig. 2) in a chimney, the top of which is 160 m. above the ground level of the works, affording excellent draught. The condensing chamber (Figs. 6 to 8) consists of a vaulted room, 3.40 m. wide and 6.60 m. long, which is divided into twelve compartments by one longitudinal and five baffle walls. The gases change direction seven times, and pass over the longitudinal wall six times, being struck six times by fine sprays of water. The six atomizers for this purpose consume 1.5 liter of water per minute, of which four-fifths is vaporized, while one-fifth flows off to the lower water basin. By this means 10 to 15% of the total flue dust is precipitated in the condensing chamber itself, and is removed from time to time as mud through the lower openings, which are water sealed. The remainder of the volatilized water precipitates the flue dust almost completely on the way to the stack, so that only a short column of steam is visible at the mouth of the stack. The flue to the stack passes for the most part underground through abandoned adits and galleries, thus providing a variety of changes in cross-section and in direction, and assisting materially the action of the condensing chamber.

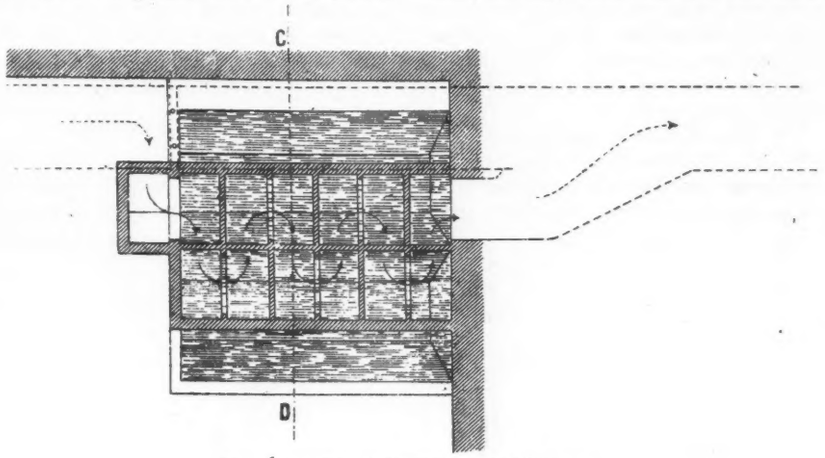


FIG. 6. FUME CONDENSER. SECTION A B.

As the charge of the shaft-furnaces is poor in sulphur, no real matte is produced, but only work lead and lead ashes (Bleischaum), which contains 90% of lead, 1.6% sulphur, 0.4% zinc, 0.85% Cu, 0.99% Fe, and 0.22% Sb. By liquation and a reducing smelt in a reverberatory furnace, most of the lead is obtained, along with a lead-copper matte, which is smelted for copper matte and antimonial lead in the blast-furnace.

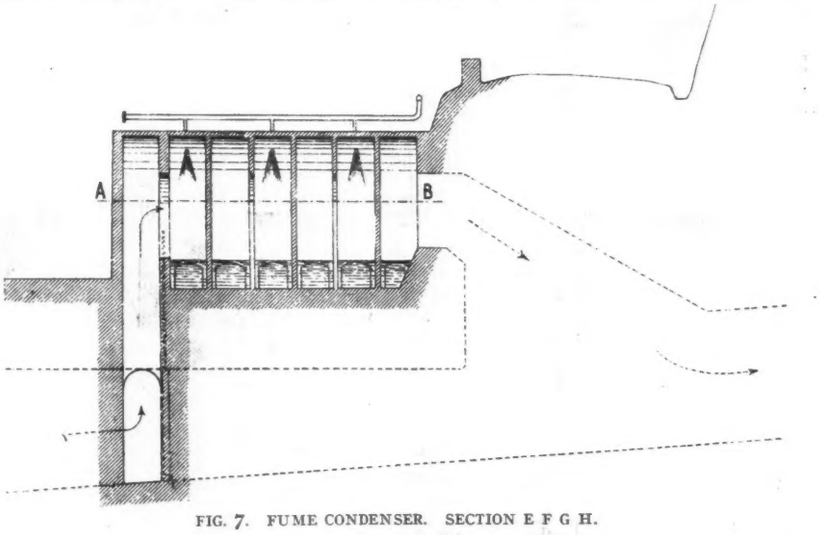


FIG. 7. FUME CONDENSER. SECTION E F G H.

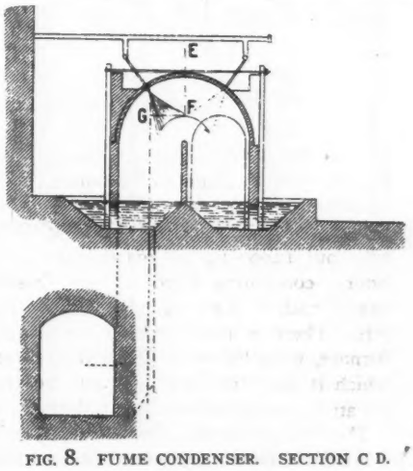


FIG. 8. FUME CONDENSER. SECTION C D.

The copper matte, containing 18% Cu, 25% Fe, 30% Pb and 18.4% S, is roasted dead in a reverberatory furnace, is sintered, and melted to copper-bottoms in a small shaft-furnace. These copper-bottoms, which contain 60% copper, and 25% lead, are subjected to liquation, and finally refined to blister copper.

The zinc-desilvering plant, Fig. 9, consists of a reverberatory softening furnace, two desilvering kettles of 14 tons capacity, a pan for liquating the zinc crust, and a small kettle for receiving the lead from the liquation process.

This pan has the advantage over the ordinary liquating kettle, that the lead which drips off is immediately removed, before it can dissolve the alloy; the silver content of the liquated lead is scarcely 0.05%, while the dry alloy contains 5 to 8 per cent.

The removal of the zinc is effected in a second reverberatory furnace. Formerly the steam-method was used, but the rapid wear of the kettles, and the excessive formation of oxides called for a change in the process. The zinc-silver alloy is distilled in a crucible of 200 kg. capacity, and is cupelled in an English cupel furnace. The details of the reverberatory furnace are shown in Fig. 10.

The composition of the final products is shown by the following analyses: Lead: Zn, 0.0021%; Fe, 0.0047%; Cu, 0.0005%; Sb, 0.0030%; Bi, 0.0007%; Ag, 0.0010%; Pb, 99.998%. Silver: Ag, 99.720%; Cu, 0.121%; Fe, 0.005%; Pb, 0.018%; Au 0.003%.

Petroleum in Rumania.*

The production of petroleum did not begin in Rumania until 1860. It amounted to 384,000 tons in 1903, and exceeded 410,000 tons in 1904; this puts Rumania fifth among the producers of petroleum, immediately after Galicia, the Dutch Indies, Russia and the United States.

It is in the vicinity of Compina-Boustenaci-Poiana that almost all the developments are confined, where 66 operators are active. At first they got their petroleum by ditches and shallow excavations, then by pits, but now they prefer bore wells. In this district are more than 1,000 shafts, whose depth varies from 4 to 250 m. and 300 bores, the deepest of which goes to 600 m. The crude petroleum sells from $3 to $4 per ton.

A great question is that of exports. Internal domestic consumption reached 132,000 tons in 1903, a small amount, for this figure does not represent more than 5 kg. per capita. Industrial consumption of residues is principally by railroads which have used this fuel since 1887; in 1903 out of 512 locomotives, 373 were burning petroleum residues. They have found by experiment that one part of petroleum is equal to 1.33 parts by weight of Cardiff coal, and that one of lignite is equal to 0.35 part of Cardiff coal. These figures represent an economy of 475,000 francs per year. It can be predicted that in 1905 the Rumanian railroads will cease to call for foreign fuel. For steamers, the results are less striking; two postal boats have been furnished with apparatus for burning residues. The economy on the larger one, in crew and fuel, reached $22,000 in a year; difficulties were experienced on the other. The facilities for supplying petroleum at the port of Constantza are insufficient, and a considerable amount of work will be necessary in order to erect the necessary conveniences.

Exportation is increasing regularly, reaching in 1903 a total of 126,000 tons; of this, 67,000 tons went from Constantza. In order to facilitate exportation, they have projected a pipe line from Compina to Constantza, a distance of 330 kilometers, but this project is vigorously opposed.

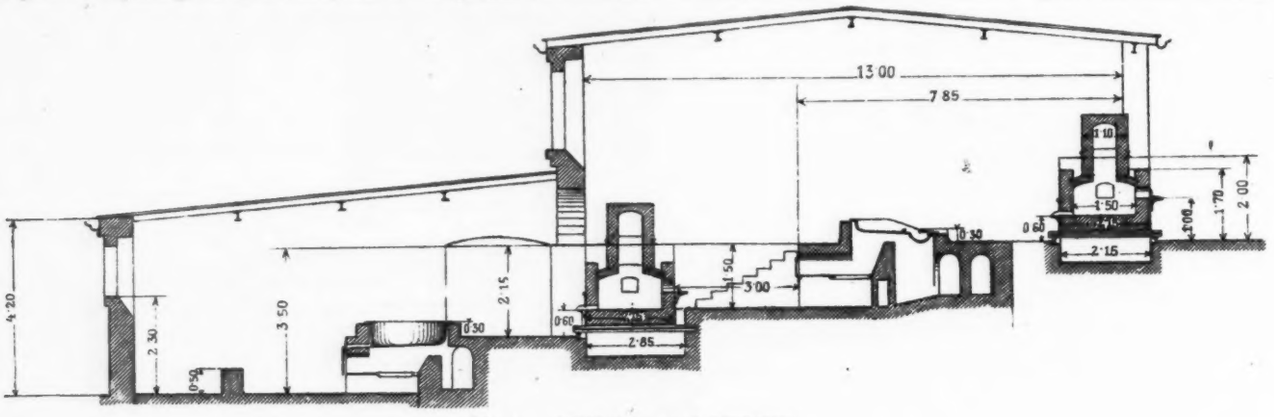


FIG. 9. SECTION OF LEAD REFINERY.

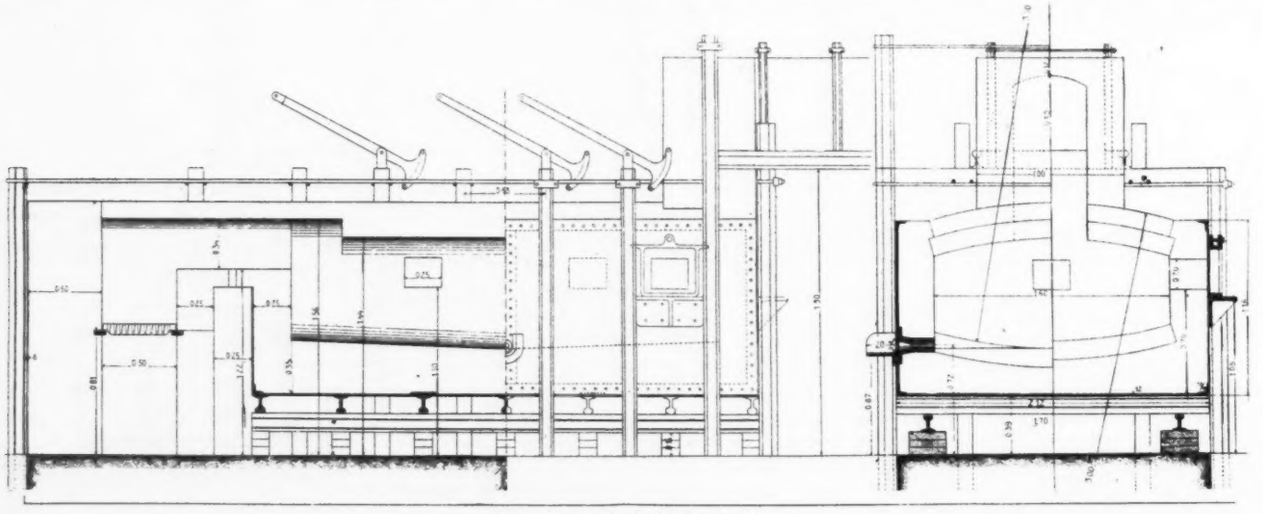


FIG. 10. SOFTENING FURNACE.

*M. Aron, *Bulletin* de la Société des Ingénieurs de France, August, 1905.

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WE GIVE SEVERAL PAGES this week to the report of the meeting of the Lake Superior Mining Institute and to one of the excellent papers there presented. The Institute is the strongest and most active of our local mining organizations, and its meetings are always interesting; so that no apology to our readers is needed for this disposition of our space. We hope to give abstracts of other papers shortly.

AN EXCELLENT PLAN is that adopted by the Lake Superior Mining Institute of holding its meetings alternately in the different districts of the region. This is a very good method, since it gives members an opportunity to see what advances are being made; and it also gives full scope for that exchange of experiences from which, after all, the chief benefit of such meetings is derived. This year the old Menominee range was the district selected.

WHILE THE CHIEF expansion in iron-ore production in the Lake Superior region this year has been on the Mesabi, the old ranges have not been much behind in improvements, in development of the mines and in exploration for extensions of the old orebodies. The whole Lake country, in fact, has been extremely active, and with notable results.

IN THE IRON and steel markets, as in the metal market, we have at present efforts to hold down prices, rather than to advance them in view of the great demand. It may be considered an unusual condition, though it is not unlike that which existed three years ago. Speculative holdings are not large, and any movement to increase them has been discouraged.

THE TALK of large iron and steel exports, which was heard some time ago, has ceased, in view of the large home demand, just as it did three years ago. Indeed, there has been some talk of importing pig iron and billets, but no considerable movement has yet developed.

THE LARGE INCREASE in blast-furnace capacity in this country within the past three or four years begins to be apparent in the present extraordinary output of pig iron. Apparently the total make in the United States this year will be considerably over 20,000,000 tons; and the activity will continue well into 1906, at least.

A CONSULAR REPORT from China speaks of an accumulation of copper, said to be 10,000 tons, at the ports of that country. This is not at all improbable, nor is it unexpected, in view of the recent large imports, and of the slow and difficult transportation in that country. It would naturally take some time to distribute this copper to consuming points, and the quantity reported is, after all, not excessive. On the other hand, we hear of more inquiries here for shipment to China, though little or no actual business has been done.

THE EXTRAORDINARY DEMAND for spelter in Europe, which has sent London prices above the New York parity for the first time, appears likely to continue for some weeks. There is little probability of relief by exports from this country, since we have little metal to spare.

AN EXAMPLE OF a big blast as an aid in hydraulic operations comes from California. In the famous old Spring Valley hydraulic mine at Cherokee, in Butte county, eleven tons of dynamite were exploded recently. For some time the miners had been engaged in driving tunnels into the face of the mine and charges of dynamite were planted with a view of shattering the clay and gravel, so that it would be washable. The face of the bank was some 400 feet in height and upward of 120 feet was pipe-clay. A tunnel had been run under this body of pipe-clay and the principal charges were placed there. The managers of the mine report that the big blast was a complete success in every particular, the object being accomplished far better than they expected. The large pipe-clay bank, which for a number of years has been a menace to the lives of the miners, has been entirely removed and so reduced that it can be easily washed.

THE INDEPENDENT oil producers in Kern and Fresno counties, in California, are about to form a large company to embrace companies in the Kern river, McKittrick, Sunset and Coalinga fields. If the plans of the producers are carried out, the properties of the independent companies will be deeded to the new corporation, and will be paid for in stocks issued by that company. By this means the new company will hold in fee simple all the oil properties in the San Joaquin valley, with the exception of the holdings of the

railroads, the Associated Oil Company, and the Union Oil Company, and will be in a position to make itself independent by building its own pipe-line to tidewater and the market. Preliminary plans have been laid for the construction of reservoirs for the storage of independent oil; they will hold at least 2,000,000 barrels. The producers in these fields have, for some time, been restive under the control of their output by the Standard.

Progress of Cyanidation.

Rumors of proposed changes in the plan of treatment at the plant of the United States Reduction & Refining Company, at Colorado City, seem to grow daily, both in number and veracity. If later history should justify the genuineness of these rumors it would be significant indeed; for the concern referred to has been almost alone in the United States in practicing what was once supreme in the solvent extraction of gold—the chlorination process. The proposed change is said to concern the sliming and cyaniding of Cripple Creek ore. Whether this citadel of chlorination as a whole has been invaded by cyanidation, or whether the change concerns simply a part of the old plant and its process, is not stated; but the very proposal to make even a partial substitution means much for the present tendency of the wet extraction of gold. For the change, if made, will not be adopted as a matter of sentiment, but only after a searching comparison of costs.

Von Richthofen.

The recent death of Baron von Richthofen removes a notable figure from the field of geology. He had an experience in travel, observation and publishing that was unusually cosmopolitan. He was probably best known to American students from his views on the alternating order of eruptives as regards acidity or basicity, in his hypothetical sequence of "propylite." andesite, trachyte, rhyolite and basalt. This theory was drawn chiefly from phenomena observed in the Western States, and was largely used as a working hypothesis in the reports of Clarence King on the "Fortieth Parallel." While this theory is not followed at present in its exact detail, yet the idea involved, namely, of a variety of differentiated eruptives from one common reservoir, has been a guiding inspiration in the best modern petrology. But Richthofen's work was broader than this, in his world-wide originality and innovation. His death came after long, efficient service to geology and physical geography.

Zinc Smelting.

The metallurgy of zinc is frequently spoken of as a backward art, the smelting process still being expensive as compared with that of lead and copper ores, while the proportionate extraction of metal is greatly inferior. This idea rests, however, on false standards of comparison. The zinc smelter, as a rule, deals with ore which has already been concentrated to a high degree, so that his practice is comparable to that of the smelter of galena concentrate, or of black tin ore, rather than to that of the silver-lead or copper smelter, who has to treat a very large quantity of ore for a comparatively small production of metal. In other words, while the copper smelter makes commonly a concentration of 20:1 and even 50:1, the zinc smelter makes a concentration of only 2:1 or 3:1. In handling the less quantity of raw material it is generally permissible to utilize wheelbarrow and shovel to a greater extent; but if the cost of the process be referred to the basis of the crude ore raised from the mine, the smelting expense may not appear unduly heavy.

California Mining Incorporations.

People interested in mining corporations organized in California, or doing business in that State, should note that the Governor has issued a proclamation, the object of which is to weed out and vacate articles of incorporation of concerns which are dead and forgotten, but which still cumber the archives of the Secretary of State. Under the new law each domestic corporation is taxed $10 a year for a license entitling it to do business under its charter, and a like sum is exacted from foreign corporations for permission to do business in the State. In case the provisions of the law are not complied with, the domestic concerns forfeit their charters and the foreign concerns forfeit the right to continue to operate in the State.

If the tax is not paid by the last of August in each year it becomes delinquent and a penalty of $5 is added. This must be paid within 60 days after the issue by the Governor of a proclamation announcing the names of the concerns that have not complied with the provisions of the law. The proclamation for this year has been issued, and forfeitures will be due on Dec. 13, unless delinquents shall have settled with the State meantime. There are in the office of the Secretary of State articles of incorporation of 43,000 concerns. A notice was sent to each of them, with a copy of the law inclosed, that the license tax was due. About 20,000 of these were returned marked "not delivered," indicating that the corporations have not paid the license tax of $10, and are probably out of business. Nearly 1,000 have paid the tax and the $5 penalty. A rough estimate places the number of live corporations in the State at from 16,000 to 20,000, and those that have not yet responded are delinquent. Unless they pay up by Dec. 13, they will forfeit their right to continue business in the State as corporations; of course this includes not only mining, but all sorts of corporations.

The Zinc Corporation.

Our London correspondent referred a few weeks ago to a new scheme originating in England, for the treatment of Broken Hill tailings. The details of this scheme are now practically completed, and a company called the Zinc Corporation, Ltd., has been formed in Melbourne under the same company laws as govern the Mount Lyell Company. Its capital is £350,000, of which £80,000 in shares goes to the Broken Hill Syndicate, Ltd., which originally conducted the negotiations for the buying up of tailings, while £160,000 is being subscribed in cash for the purpose of completing the purchases and of erecting plant. A further sum of £100,000 in £1 shares is under option at par to the subscribers of the £160,000, and the remaining 10,000 shares are held in reserve.

The corporation has entered into contracts to buy 100,000 tons of tailings from Block 10, a similar amount from Block 14, and South Broken Hill, with options on the remainder of the tailings belonging to these companies. Negotiations are also proceeding for the purchase of tailings from the British Broken Hill Company. It will thus be seen that practically all the companies are selling their tailings, the exceptions being the Broken Hill Proprietary and the Sulphide Corporation, both of which are already starting to treat their own zinc tailings in their own plants.

The directors of the Zinc Corporation include such well known names as Her-

bert J. Daly, H. C. Hoover and C. S. Herzig. The Broken Hill Syndicate, which floated the corporation, is composed of a group of London promoters, including Lionel Robinson, Albert Reitlinger and others. This syndicate was also instrumental in selling the Broken Hill South Blocks to the Lake View Consols, as announced by us in a recent issue.

The Zinc Corporation is not in a hurry to adopt any special process for separating the zinc sulphide from the tailing. There are many processes which will effect the separation, such as the Carmichael-Bradford, Huntington-Heberlein, Savelsberg, De Bavay, and the new Elmore vacuum, and it is highly desirable that their relative values should be demonstrated before launching out into heavy expenditure on a plant.

The Card System of Accounting.

In another column of this issue, we publish the valuable paper of Mr. W. M. Jeffrey on the card system for mine supplies. This card system is only one of the many efficient innovations in improved modern book-keeping. The subject has been repeatedly considered in this JOURNAL, notably by Mr. F. W. Denton and Mr. T. B. Comstock, some two years ago. After all has been said regarding the finding and keeping of ore reserves, the business end of mining and metallurgy entails a tireless watchfulness on detailed expense accounts. If this system is particularly suited to this end—and the unanimous testimony of much varied experience is to that effect—this system should be utilized by our profession, and to its fullest extent.

It is a common complaint of the superintendents in some large plants that the attitude of the accounting department seems to assume, not that the book-keeping should be adapted to the plant, but that the plant must be run to suit the book-keeping. What the choice should be between these alternatives, goes without saying; but many a superintendent can testify thereon, that this comparison is no jest.

Doubtless the ignorance displayed by most members of the average book-keeping staff regarding the technical details of the supplies for mining and metallurgy may hinder the pliable and effective working of any system of accounting. This is always a serious difficulty, but the matter of selecting and adopting the best system of accounts is one that calls for the most prayerful effort of the superintendent.

Regarding this special innovation of the card system, as was remarked by Mr. Comstock several years ago, the general idea is by no means new among other lines of manufacture and commerce. Its adoption by mining men seems to have been a tardy recognition of its good service elsewhere. This last word in its favor is entirely in keeping with the good reports which come in steadily from those who give the system a trial. We hazard nothing in predicting a further growth and adoption of this type of book-keeping.

To be sure, now and then, there is a minor note of criticism, in the generally harmonious chord of approval. It is well to acknowledge this, and further to emphasize that Mr. Jeffrey carefully points out, at least by implication, that the system alone will not do everything. As properly used, the card system does its part of the work and does it well, by a proper articulation with such books as are indispensable and that are so regarded. One advantage of the card system which will appeal with particular emphasis to mining engineers, both of construction and of operation, is the facility with which it should lend itself to the minute analysis and detailed distribution, both of supplies and of costs. Indeed, we may expect to receive much fuller and more rational results concerning costs for every phase of operation, from this promising subsidiary of accounting.

The Rio Tinto Company.

A bold stroke in connection with the finances of the Rio Tinto Company is being taken, by the redemption of the whole of the debenture bonds and the substitution therefor of a new block of ordinary shares. In order to understand the details of this rearrangement it is necessary to review the financial position of the company.

It will be remembered that these famous copper mines, after a chequered career of centuries, were sold by the Spanish government, in 1873, to an English company. This company became a dividend payer in 1879, but the dividends were small at first, and the company was handicapped by three sets of mortgage bonds carrying 5% interest. The present prosperity of the company dates from 1895, when the debenture debt was reorganized and consolidated into one issue of £3,600,000, bearing 4% interest. These bonds were to be redeemed by means of a sinking fund by half yearly drawings and they would in this means be entirely extinguished by the year 1929.

The ordinary share capital of the company as distinct from the debenture debt was at the start £3,250,000 in shares of £10 each, but in 1897 each of these shares was split into two, one being a preference share carrying 5% dividend, and the other an ordinary one. Since 1897 the improved practice at the mine and the satisfactory arrangement of the capital and debenture debt have combined to make the company's shares and bonds excellent investments, and the majority of people never expected that any alteration would be made. It came as a great surprise, therefore, to find that the company intended to take advantage of a clause in the agreement of 1895 by which it is possible to retire the whole of the outstanding debentures at any time after June 30, 1905.

The plan proposed is to raise the necessary money by the creation of 50,000 new ordinary shares, nominally of £5 value, but issued at £60. This will provide £3,000,000 and the debenture debt unredeemed is £2,989,000. These new shares will be offered first to present shareholders and bondholders, and there is not the least doubt that they will be all taken up without appealing to the outside public. Since 1897, when the ordinary shares were split, the yearly dividends have been 40%, 47½%, 80%, 85%, 72½%, 50%, 70% and 70%, while an interim dividend for the current year has just been declared at the rate of 80%. For the eight complete years the average dividend has been nearly 65%, and if we reckon this as a probable average for the future the new shares will return nearly 5½% on money invested. The probability is that the average rate will be higher than 65%, for there is little likelihood of the price of copper going down. With the finances and metallurgical practice on a safe footing, the price of copper will be the only factor in determining the profits. As for the life of the mine, there is enough ore proved to last a hundred years.

To be able to redeem £3,000,000 of debentures of a mining company at a cost of 50,000 new ordinary shares is a stroke of business that comes to few even to imagine, let alone to carry out, and to Mr. C. W. Fielding, the chairman and strong man of the company, too many congratulations cannot be given.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Secondary Enrichment in Veins.

Sir—There is one subject pertaining to practical mining which, in my opinion, ought to receive a greater share of attention; that is, the secondary enrichment of gold veins. I am engaged in developing a gold quartz vein, situate in Ruby Creek district, Idaho, where the conditions referred to above seem to be well illustrated.

The vein, with an average width of 4 ft., strikes E. W., with a dip of 80° S.; the enclosing rock near the surface is silicious mica schist, resting on a great laccolite of quartz-monzonite. As the vein cuts the strike of the enclosing rocks at an angle of 85°, it may be classed as a fissure, formed on a dip-fault.

The vein-filling consists of a fine-grained, grayish quartz, carrying large amounts of the common sulphides (iron and arsenical pyrites, with blende and a little galena). At and near the surface, these sulphides are completely leached out, leaving the cavities in the quartz devoid of even iron oxide, and giving the rock the appearance of a scoria. At this horizon, the quartz is low grade, averaging $3 per ton in free gold, which is of the flour variety. A tunnel was driven, intersecting the vein at a vertical depth of 63 ft.; there, the cavities of the quartz are filled with iron oxide, and the average value per ton in gold is $24, while the gold appears much coarser than that found nearer the surface. Another tunnel, driven at a lower altitude, and situate 20 ft. above water level, cuts the vein at 250 ft. perpendicular depth; there the vein matter has the same appearance as that shown in the upper tunnel, but carries an average value of $65 per ton in gold, which is free and also much coarser than that found at the outcrop.

As already stated, the enclosing rock near the surface is mica schist (composed of quartz and muscovite, with a small amount of chlorite); it is noteworthy that no feldspar minerals have been detected in this rock. At the intersection of the vein, in the upper tunnel, the dome-like upper part of the quartz-monzonite is exposed and constitutes the hanging wall; the same rock forms both walls in the lower tunnel. This granitic rock is composed of feldspar, quartz and muscovite, the feldspar predominating.

The question naturally arises whether this feldspar did act as a reducing agent on the gold solutions which may have been formed through the agencies of surface weathering; acting on the large quantities of sulphides, changing them to sulphates, and dissolving the gold, which was then carried down, to be re-deposited on coming in contact with the feldspar. This theory may also explain the flour-like condition of the gold in the upper portions of the vein and its coarser form in the lower levels.

R. L. MANN.

Jansville, Idaho, Sept. 5, 1905.

Mining in the Yukon.

Sir—In a recent issue of this JOURNAL (Sept. 30, 1905, p. 611), a letter from Dawson notes certain discoveries which I visited in person. New "prospects" continue to be staked in the vicinity of Windy Arm, 10 miles from Caribou Crossing, at the lower end of Lake Bennett. It is, however, uncertain what these discoveries will amount to, as little development work has been done.

The veins are generally narrow (6 to 30 in.), pitching in various directions through what appears to be silicious porphyry. The veins also are highly silicious, some of them being almost pure quartz. Galena is found in all of them, with small amounts of copper, iron and zinc. The value is chiefly in silver, with some gold.

Ruby silver was the only silver mineral recognized, and this is of rather frequent occurrence. In some of the veins the rich ore runs in seams, from 2 to 6 in. wide; in other veins it is bunchy, often disappearing entirely and then within 10 ft. may show a face a foot wide. The low-grade ores will probably concentrate to a shipping product.

At the time of my visit (the latter part of August) J. H. Conrad had control of all the principal prospects and was working a large force of men; but the work was not sufficiently advanced to insure much output this winter.

The White Pass & Yukon railroad has made favorable rates from the mine to all Pacific coast smelters; the smelters have offered fair rates; consequently a fairly low-grade ore may be shipped at a profit. This is rather surprising when we recall the location. But even with these low rates, the quantity of material shipped cannot possibly be large for some time to come.

F. F. SHARPLESS.

Westbury Station, N. Y., Oct. 3, 1905.

Mixed Sulphide Ore Treatment.

Sir—I wish to correct a statement made by Franz Meyer in his letter on "Mixed sulphide ore treatment" (this JOURNAL, Sept. 2, 1905, p. 407). We have not abandoned the use of the Blake machines, but continue to operate them, both alone and on tailing, as formerly, according to our ore supply. Ours is a custom mill, with much variation in ore treated, and with corresponding modification in method. Neither the magnetic nor the static machines will treat *all* ores. Presumably the fact that the Blake machines have often been idle (through lack of suitable ore) has led to this misunderstanding, which it is only fair to correct.

H. RANDOLPH GUGGENHEIMER,
Manager Colorado Zinc Company.

Denver, Colo., Oct. 15, 1905.

The Lake Superior Mining Institute.

BY C. E. L. THOMAS.

The Lake Superior Mining Institute assembled at Iron Mountain, Mich., Tuesday, Oct. 17, for its eleventh annual meeting. The attendance was much larger than last year, about 260 members and guests being present, and the itinerary was more extensive than the Gogebic range meeting in 1904.

Tuesday, the first day of the meeting, was marked by inclement weather, a drizzling rain falling during the entire day. This did not interfere with the program to any extent, however, and those in attendance visited the Chapin mine, the first point of interest. O. C. Davidson, general manager of the steel corporation's Menominee range properties, and retiring president of the Institute, received the visitors. The Chapin for a number of years was the largest developed body of iron ore in the world, but was outstripped by the Mesabi range properties in Minnesota. It will produce probably 900,000 gross tons this season, and is employing nearly 1,000 men. The ore is a non-bessemer, 59% iron and 0.06% phosphorus. The new steel shaft at the Ludington mine was visited. It is 10½ by 21 ft. in dimensions and steel braced, the wall plates and dividers being rivet-framed on surface and lowered into position. Railroad steel and I-beams are used to best meet the requirements. No. 2 Hamilton shaft is equipped with one of the few flat-reel cable hoisting engines in the Lake Superior district. This is the only shaft from which ore is hoisted, it being used exclusively for that purpose. Kimberly skips of three to five tons capacity each, operating in balance, are used. The shaft is down 1,460 ft., but ore is being taken from a depth of 1,000 ft. The men are handled through the B Chapin shaft, 1,000 ft. deep. The two five-ton Kimberly skips in No. 2 Hamilton shaft have hoisted as much as 2,530 tons of ore in 10 hours. Last month the shaft produced 90,000 tons of ore. The caving system of mining is used. The new steel-lined shaft, known as the C Ludington, is 1,125 ft. deep and is being opened for timber, pumps and ore hoisting.

After leaving the Chapin, the party reached Pewabic mine by special train This property is owned by the Carnegie Steel Company and Milwaukee people, the interests of each being about equal. It

produced its first ore in 1890. Some of the very finest grades of iron ore ever taken out of the lake district have been secured from the Pewabic. No. 1 is the principal shaft of the old workings. It is 950 ft. deep, and has seven levels. A test shaft is down 200 ft. in the south formation, and drifts will be extended at greater depth for exploration. The Walpole, also the property of the Pewabic company, produces most of its ore through No. 2 shaft, 710 ft. deep. It will be equipped with an electric tram during the winter. Present plans of the Pewabic are to start the concentrating plant at the Keel Ridge mine next season. It has been idle several years.

In the afternoon, members of the Institute and their guests reached the Florence mine, at Florence, Wis., by train. The mine is operated by the Florence Iron River Company, controlled by Ladenburg, Thalman & Co., of New York. Felix A. Vogel is general manager and H. L. Chamberlain, superintendent. A short time ago the old mine timbers took fire, burning out, and communicated to the iron pyrite below the bottom of the old pit. No. 7, to the west, is the principal shaft. It is 800 ft. deep and recently important finds have been made. Two diamond drills are searching for other orebodies. The Florence employs 225 men, and will produce 235,000 tons this season. Visitors were served with light refreshments in the engine-house.

From Florence the Institute proceeded to Crystal Falls, Mich., general headquarters of Corrigan, McKinney & Co., whose Tobin mine was visited first. It is 650 ft. deep, employs 200 men, and will ship 240,000 tons this season. The caving system is used, the Hennepin shaft being a producer and the Tobin is receiving its equipment. The latter was recently enlarged to four compartments and equipped with two Kimberly skips in balance, the other two compartments being for pipes and ladders. The Tobin will become the main shaft, as the Hennepin is threatened by caving.

Corrigan, McKinney & Co.'s Great Western mine was the next property that was visited. The Great Western is producing 800 tons daily. Caving near the mouth of the shaft carried the surface down 200 ft. Sand was used to fill the cave, and will be continued as a filler, prolonging the life of the shaft, which is down to the twelfth level.

Tuesday evening a business session of the Institute was held in the Iron county court-house at Crystal Falls, papers being read and business concerning the Institute being transacted. "Methods of iron ore analysis used in the Lake Superior mining district," was a paper presented by W. A. Siebenthal, of Republic, Mich. L. Battu, of Chicago, had a paper entitled, "The Rateau exhaust steam regenerator system." "The method of surveying for secondary mine openings," was presented by Floyd L. Burr, of Vulcan, Mich. Following the meeting the Iron County Mining Club entertained the Institute at a banquet in the opera house.

The Institute arrived at Vulcan and Norway, Mich., Wednesday morning, visiting the Vulcan and Curry mines of the Pell Iron Mining Company, of which William Kelly is general manager. The Vulcan is 1,200 ft. deep, and the Curry 1,100 ft., being connected underground. The model change-house and dry-house described in a paper read before the Institute by Mr. Kelly a few years ago is at the Vulcan. The Vulcan and Curry are wet mines, the amount of ore and water handled being at the ratio of 1 in 12. Three miles distant, at Sturgeon Falls, the Penn Company is developing 3,500 h.p. There is a 22-ft. fall in the Menominee river, and a hydro-electric power plant is being installed. A concrete dam is being started. It will be 31 ft. thick at the base and 175 ft. long. A canal, 200 ft. long, is being cut to deliver the water to the turbines below the dam. Owing to the muddy road, the Institute did not visit Sturgeon Falls.

After leaving the Vulcan, the Institute walked to Aragon No. 5 shaft of the Oliver Iron Mining Company, which employs 500 men and will produce 500,000 tons this season. It is 1,050 ft. deep, the surface plant is an excellent one, and the property has a brick chimney, few of which are found in the iron district.

From Norway and Vulcan the Institute returned by train to Iron Mountain and visited the Traders mine of the Republic Iron & Steel Company, William Watson, manager. The Traders employs 70 men, and will produce 150,000 tons this season. It is a double open pit, the pits being 150 ft. deep, 400 to 500 ft. wide and 600 ft. long. The ore is 41% iron and 0.015% phosphorus. The orebody is of immense size and has yielded 1,000,000 tons during the 10 years of sporadic operations.

The Institute assembled in the Dickinson county court house at Iron Mountain, Wednesday evening, for a business meeting and to listen to papers. John L. Buell, of Quinnesec, Mich., read a paper on "The history of the Menominee range." John T. Jones presented an illustrated paper on "The unwatering of the Hamilton shaft." Frank Armstrong, of Vulcan, presented a paper, illustrated with stereopticon views, on "Recent changes in the Republic mine." A paper on "Determining the defection of diamond-drill borings" was presented by Frank A. Jansen, of Norway, who illustrated the method with brass tubes, glass tubes. The auditing committee reported having examined the books of the secretary and treasurer. Secretary A. J. Yungbluth reported a membership of 426 and a cash balance of $3,639. Sixty-one new names were presented for membership and accepted. The nominating committee presented the following names: For president, James McNaughton, Calumet, Mich.; vice-presidents, 2 years, F. W. Denton, Painesdale, and J. M. Longyear, Marquette; managers, 2 years, J. R. Thompson, Ironwood, F. A. Vogel, Florence; secretary, A. J. Yungbluth, Ishpeming, Mich.; treasurer, E. W. Hopkins, Commonwealth, Mich. A vote of thanks was extended to Secretary Yungbluth, as also to the railway companies, the people of the various towns visited and all who had contributed to the pleasure of the Institute. Following the meeting, the Iron Mountain Club entertained at a smoker and lunch.

Thursday morning the Institute arrived in Escanaba and visited the ore-crushing plant of the Oliver Iron Mining Company. It has been in operation less than a year and is uncompleted. As high as 50,000 tons a month, operating 10 hours daily with one crusher, has been treated. The timber-preserving plant of the Chicago & Northwestern railway was visited. The plant has a capacity of 800,000 to 1,000,000 ties per day. The average cost of treating a tie, including labor, chemicals, fuel and all expenses, is 15 cents.

Next the Institute boarded the steamer *Maywood* and was taken to the docks of the C. Reiss Coal Company, where the apparatus for unloading boats was examined. The *Maywood* then carried the Institute to the hardwood plants of the I. Stephenson Company, at Wells, one of the largest lumber manufacturers in the country. The Machek Chemical & Iron Company is a subsidiary concern and manufactures the material rejected by the sawmills and other plants into charcoal, securing as by-products acetate of lime and wood alcohol. The *Maywood* then took the Institute to Gladstone. There the charcoal furnace and by-product plant of the Pioneer Iron Company, controlled by the Cleveland-Cliffs Iron Company, was viewed. The furnace manufactures 110 to 120 tons of pig iron daily. The furnace was placed in blast recently, after an idleness of a year and a half. Previous to that it had been operated for four years. The fires were banked when the furnace was closed down, and when operations were resumed the drafts were opened and the plant put in commission again without rebuilding the fires or withdrawing the charge.

Returning to Escanaba, the Institute was served supper at the Oliver and Ludington hotels by the Business Men's Association, which also provided the lunch aboard of the *Maywood*. Nearly all those in attendance at the meetings departed for their homes from Escanaba, greatly refreshed from their outing and possessed of a much better knowledge of the resources of the Menominee range. We publish herewith one of the papers presented, and hope to give others in our next issue.

The Card System for Mine Supplies.*

BY W. M. JEFFREY.†

In outlining a method of accounting for mining supplies, I have in mind the excellent paper on this subject by Mr. Denton, and the consideration that it has received in other papers on accounting methods that have been heretofore submitted to this Institute and embodied in its records. It would seem, therefore, almost needless to attempt to add anything to what has already been presented. However, this subject is of sufficient interest to call for additional discussion.

When we take into consideration the fact that mining supplies constitute, approximately, 30% of the cost of producing the ores, it is no wonder that operators are deeply interested in the methods of accounting for such a large percentage of the producing cost. There has been an almost endless amount of thought and energy expended in endeavoring to protect payrolls (the labor portion of producing costs), and, I regret to say, without furnishing a system that gives the employer absolute assurance that his payrolls are free from error or manipulation.

The first duty of an individual, a copartnership or a corporation, when it has a valuable asset that must be intrusted to the care of an employee, is to select a person who has the ability and the honesty to account for such asset. None will dispute the fact that mine supplies comprise an item of great importance. A large amount of capital is required to be invested continually in material necessary for operation, and sufficient material must be on hand at all times to assure the continuous operation of a property. It would be false economy, surely, to allow the stock of material in the warehouse to reach a point where operations would have to be delayed, awaiting the receipt of material. On the other hand, an excess stock, needlessly tying up capital, must be guarded against; and the oldest stock should be worked off, whenever possible, to prevent its becoming obsolete.

To accomplish the result of having the material account well guarded, and to keep investment in material at the lowest point consistent with economical operation, some of the mining companies have adopted the plan of general warehouses; that is, where a mining company owns several mines in one locality, although the mines may be separated by considerable distances, they have a warehouse as centrally located as possible, where the entire stock of supplies for all mines is carried. This plan, in the first place, necessitates but one warehouse man, with special ability for this work, and it saves the cost of having a man of this class at each mine. Moreover, the clerical work of the central warehouse can be done by cheaper labor under the direction of this one man. In the second place, this arrangement permits of carrying a smaller stock of supplies than would otherwise be possible. It is unlikely that a similar part of any class of machines will break at all mines at the same time, and one or two spare pieces carried in stock will guard the interests of all mines in the vicinity; whereas, separate warehouses at each mine, under different warehouse men would in all probability each have a part for a similar machine, for the reason that possibly the warehouse men would not be in close touch with each other. The extent to which the stock of mine supplies is reduced, by the plan of central warehouses, cannot be realized by one who is not familiar with supply work.

To digress somewhat from the accounting phase of the subject, I would state that a great saving in the quantity of supplies necessarily carried, can be accomplished by using, as far as possible, uniform machinery at the various mines. This is especially true in the case of power drills, steam-shovels, pumps, etc.

Regarding the selection of the man who is to have charge of the warehouse, no merchant, who does not give his personal attention to his business, would think of employing anyone to look after his stock in whom he did not have implicit confidence, and whom he did not know to have an extensive experience in his particular line; he would also offer such a man a salary that would enable him to have all of the necessities and some of the luxuries of life, thus eliminating, as far as possible, temptation for his employee to increase his income by giving his attention to some "side line" or other scheme injurious to the employer's business.

In some of the mine warehouses in this mining region (Lake Superior) there is stock with a value of from $50,000 to $150,000. There should not be the slightest hesitation on the part of operators carefully to select a man who is to take charge of this investment, and to pay him wages commensurate with his duties and responsibilities. If this is done, operators can rely on it that they are receiving value for their expenditure. They can also rely on it that investment in supplies will not be larger than is absolutely necessary; also that a system of accounts will be evolved which will give not only a correct and satisfactory distribution of supplies used, but also, whenever it may be desired, a satisfactory and accurate inventory of material on hand.

The warehouse systems in use some few years ago were almost as numerous as the warehouses; but more recently, on account of the combination of various companies, we have all had opportunity of becoming familiar with the various systems and of studying this subject with a view to uniformity. The following system is one of the most satisfactory:

Invoices, covering purchases, are received in duplicate and are sent to the person ordering the material, to be approved by him as to price, point of delivery, terms of purchase, etc. As soon as the invoices have this approval, they are forwarded to the point to which the supplies are consigned. When the local mine office receives these invoices, the duplicate copy is sent to the warehouse for approval as to the receipt of the goods; the original copy being retained in the mine office until the duplicate is returned to it by the warehouse man, at which time he signs the original invoice, indicating that the goods have been received at the warehouse. The original bill is held in the mine office, while the duplicate bill is in the warehouse, in order that the chief clerk at the mine office may know at all times what bills have been referred to the warehouse which have not been returned to him. In this way the chief clerk can watch cash discounts on bills, and can see that the warehouse does not hold the invoice beyond the discount period (thus losing the discount); he can also have a check on the warehouse to see that none of the invoices turned over to them for approval are lost. It frequently happens that material does not reach the warehouses until after the discount period has passed; in such cases, the mine office forwards the invoice for payment, prior to the receipt of the goods, in order not to lose the discount privilege, where the invoice is from a well-established firm. In these cases, a notation is made on the invoice that the goods have not yet been received, and the treasurer uses his judgment in paying such invoices

FREIGHT RECEIVED RECORD.

DATE RECEIVED	FREIGHT			CONSIGNOR	DATE OF INVOICE	ARTICLES	QUANTITY RECEIVED	INVOICE			REMARKS
	R. R.	PRO. NO.	AMOUNT					OUR NO.	DATE REC'D	DATE PASSED	

FIG. I.

*Paper read before the Lake Superior Mining Institute, October, 1905.

†Auditor, Oliver Iron Mining Company, Duluth, Minn.

prior to the receipt of the material. In doing this, very little if any risk is taken, for the reason that, almost without exception, the houses from which material is purchased would probably make good any lost or defective material, and the gain in taking advantage of cash discounts is something that cannot be neglected. As soon as both original and duplicate invoices are approved, the mine office forwards them for payment.

The warehouse records consist of a freight-received book, a box of supply cards, and a supply of debit and credit slips. As material reaches the warehouse, a record is made in the freight-received book (Fig. 1), showing date received, name of railroad, pro number, and amount of freight charges; also consignor, date of invoice, articles received, quantity received, local number of invoice, date invoice received, date invoice approved, and any remarks that may be found necessary. This book, in addition to being a valuable record of freight received, guards against passing an invoice for the same material twice. It can readily be seen how much assistance this record is to the warehouseman in cases where goods are received prior to the receipt of an invoice. It is also a great assistance in checking freight bills, where the freight bills are not received at the same time at which the goods are delivered. I find that this latter frequently happens.

SHEET NO._____

ACCOUNT_____ CLASSIFICATION NO._____

DATE	INVOICE		QUANTITY	PRICE	AMOUNT	DATE	USED		QUANTITY	PRICE	AMOUNT
	OUR NO	CONSIGNOR.					NO.	ACCOUNT.			

FIG. 2. SUPPLY CARD.

The supply cards, Fig. 2 (about 8 in. by 12 in.), are ruled in ledger form. The debit side shows the date of invoice, local invoice number, consignor, quantity, price and amount. The credit side shows date, account for which supplies were used, quantity, price and amount. We use one of these cards for each grade or size of each class of supplies; that is, we would have one card covering 40-% powder, another card for 60-% powder, one card for 1-in. elbows, another card for 1½-in. elbows, and still another for 2-in. elbows, etc. As soon as the duplicate invoice, covering material purchased, reaches the warehouse, and is approved as to receipt of material, the warehouse man charges on his supply cards, direct from the invoice, his various classes of supplies. The amount of freight is also charged on each card, covering material which is entered thereon. The division of freight is made, in cases where there are a number of items received in one bundle, in accordance with weight of the various items. Probably all warehouses have a record of the weights of various fittings and other commodities that are liable to be shipped in one bundle, and the division of freight is made, based on these recorded weights. Each card, then, represents the cost of the various items of supplies delivered at the warehouse.

The question of cartage will frequently arise. Where material, necessitating considerable cartage, is received for a specific purpose, it is usually a small matter to apply the cost of the cartage directly against the material hauled, for the reason that it is usually of considerable bulk. However, when a team is sent to the depot and brings to the warehouse a miscellaneous assortment of supplies, and possibly does other errands on its way to or from the freight sheds, it has not been the custom to attempt to put the cost of cartage, in such cases, against the cost price of supplies; but such expense has been pro-rated to the operating-cost accounts, in proportion to value of supplies used or absorbed in a general surface cost account; the latter is considered as just a disposition as can be made of these small charges. The cost of operating the warehouse is not added to the cost of mine supplies; but is treated as a separate cost account, just as office expense is treated as a separate cost account.

In determining the cost at which supplies should be charged to the operating accounts, two methods can be used: First, an average cost of each size or grade of mining supplies on hand can be obtained by dividing the total value (as shown on the debit side of the respective supply cards) by the number of pieces on hand. Second, by using the price of the oldest supplies on hand until all items at that price shall have been consumed; then use the price of the next lot until they are consumed. It would be unusual to have more than two different prices on any one size or grade of material in stock at once. I prefer the latter plan, for the reason that the stock then always stands at the very latest price that we have; and, with the card system, it is not difficult to tell what quantity is on hand at the old price. After the invoices have been recorded on the supply cards at the warehouse, they are turned over to the mine office, as previously outlined. This completes the receipt of supplies.

The debit and credit slips are records covering the disbursement of supplies. The debit slip (Fig. 3) is a form, 8 by 11 in., with a printed heading indicating the mine at which the supplies are used, the week during which the supplies are issued, and *the cost account to which the supplies are being charged.*

The credit slip (Fig. 4) is a form of the same size as the debit slip; it has a printed heading, indicating the mine at which the supplies are used, the week during which the supplies are issued, and *the class of supplies that is to receive credit.*

DEBIT.

_____MINE.

Supplies Charged to Account No.__ Week Ending_____190__

CLASS NO.	ARTICLES									TOTAL QUANTITY	PRICE	AMOUNT

FIG. 3.

CREDIT.

_____MINE.

Supplies Consumed Week Ending_____190__ _____Class.

CARD NO.	ARTICLES									TOTAL QUANTITY	PRICE	AMOUNT

FIG. 4.

Regarding the disbursement of supplies, none are issued from the warehouse without an order from the superintendent of the properties, or from someone authorized by him to issue orders on the warehouse. These orders, in addition to stating the items of supplies required, show from what account they are to be used, and are signed by the superintendent, or foreman issuing the order.

As the warehouse man has opportunity, the material covered by these orders is entered on a debit slip. One of these slips is used for each cost, construction, improvement, or other account that it may

be deemed necessary to keep; and all articles of supplies used for each account are shown on the respective debit slips for the account indicated by the order on the warehouse for the material. There are seven columns on this form, one for each day in the week; these columns are for the purpose of saving extensions. Thus, if there are 100 lb. of powder delivered for stoping on Monday, the grade of powder is noted in the article column on the stoping card, and the weight entered in the first column. If 100 lb. is delivered the next day, the article will not have to be entered on the debit slip a second time, but the weight is placed in the second column, and so on for the weight of that particular grade of powder delivered for each day during the week, at the end of which time the sum of the weights for the six or seven days is extended in total-quantity column, the price being filled in and extension made. This means an extension once a week for each size of each kind of supplies used for each account. At the end of each month a summary of these debit slips is made, to show the total supplies charged to each of the operating, construction or improvement accounts. This summary consists of adding together the weekly total chargeable to each account.

In addition to entering these orders for material on the debit slips, as outlined above, they are entered also on the credit slip, in accordance with the class of supplies that was delivered. A credit slip is kept for each of the different classes of mine supplies; that is, one for explosives, one for candles, another for oils, one for iron and steel, etc. In entering the orders on these credit slips, the items are entered by grades or sizes, and the same plan is followed in regard to collecting the number of pounds or pieces of each grade or size delivered during the week, that is followed on the debit slips. A summary of these credit slips is made each month to show the total of each class of supplies used during the month; this is accomplished by adding together the totals of the four or five weekly credit slips. The total of the credit slips for a given period must equal the total of the debit slips for the same period, showing that the articles and values charged to the cost accounts, agree with the articles and values that are being credited to the supply accounts.

From these credit slips we obtain the information necessary to complete the credit side of our supply card. Each grade, or size, of each class of supplies is shown separately on the credit slip, and we obtain, as shown above, the total of each for a week; this total can be readily transferred from the credit slip to the credit side of the respective supply cards. It is deemed advisable to have these transferred to the supply card at least once a week, in order to have the supply card show more accurately the actual inventory on hand. If it were allowed to run for a month, the card would be of little value until the month's work is entered. This completes the warehouse records covering disbursement of supplies.

The supply cards can now be footed and balanced, showing the quantity and value of each kind of supplies on hand. The warehouse records are not duplicated in any way in the mine office, although from our mine-office books we can check the correctness of the warehouse records in the following way:

The mine office has an invoice, or an audited voucher record, with a debit and credit page, each divided to provide for a total, and for twenty-seven different classes of supplies. At the first of each month the inventory at the close of the preceding month is brought forward onto the debit page of this record. Each invoice, after it is approved and passed for payment by the mine office, is entered on the debit side of this record, and the value of the items thereon distributed into the proper columns. As soon as all invoices for the month are entered (and it will be borne in mind that the warehouse records and the mine-office records close with the same invoice), the various columns in this record are footed and balanced across with the total column. These footings give, of course, the inventory at the close of the preceding month of each class of supplies, plus the additions of each class of supplies during the month; if there were no supplies consumed, this would represent the inventory of material on hand. However, as soon as the warehouse has its debit and credit slips completed and balanced for the month, and has taken the necessary record on the credit side of its supply cards from its credit slips, the debit and credit slips are sent to the mine office, together with a summary from each, which has been prepared therefrom, as shown above. The mine office, from these summaries, makes its journal entry, crediting each of the twenty-seven classes of supplies (as per summary of credit slips) and charging, from summary of debit slips, each operating, equipment or other account which it has been found necessary to keep.

This journal entry, in addition to passing through the journal as to totals, is entered on the credit side of the mine-office invoice record in detail. The difference between the debit and credit pages of this record will now show the book inventory of each of the twenty-seven classes of supplies on hand.

While the mine office keeps but twenty-seven divisions of supply account, the warehouse has, in its supply-card record, a large number of sub-divisions of each of these classes. Once a month the warehouse furnishes the mine office with a balance sheet, which shows the amount, respectively, of each of the twenty-seven classes of supplies on hand at the end of the month, according to the supply cards; the mine office checks these balances against its own balances, as shown by its invoice record. This balance sheet is made up by adding together the balances shown on all cards in the warehouse going to make up a sub-division on the mine-office record. For instance, the warehouse may have twenty-five cards, covering different sizes of iron and steel; now, the total of all of these twenty-five cards will be required to make up the balance of the iron-and-steel account in the mine-office record. If the warehouse records are not in agreement with the mine-office records on any of the various classes of supplies, the work must be checked up and the trouble located and corrected.

In addition to this check on the warehouse as to correctness of its records, we have, of course, the actual inventory; no balance of any kind of supplies can be in error for any length of time, because the warehouses continually keep checking the actual inventory of material on hand with the card inventory, and if any discrepancy exists it is readily located and adjusted.

While this matter of checking actual inventories with card inventories is being continued at every opportunity, it is done especially when a new supply of any class is being ordered. This is done for the purpose of knowing when it is absolutely necessary to order the supplies; and also because, when the stock is almost exhausted, then is the most convenient time for making an actual count or for taking the actual weight of any material.

It may be contended that in using cards and the debit and credit slips, there is a possibility of some of these records being lost. This, of course, is a contingency that is met in all loose-leaf records; but it may be well guarded against by having proper binders, both in the warehouse and in filing in the mine office.

The benefits to be derived from a system of this kind are many; I will mention but one or two of the principal advantages. The first of these is the fact that we are enabled to get a correct supply cost on our cost sheets, by being able at all times to know absolutely the cost of each article of supplies; this is because the inventory is so well guarded from leaks of different kinds that it is not necessary to add to our supplies consumed a percentage of profits to make up for any possible loss in the handling of supplies. If a cost sheet is to be of any use to an operator, it must be accurate, otherwise it is misleading rather than beneficial. Anything, therefore, tending to improve the cost sheet is of great benefit to the operator who is responsible for the cost of producing ore.

The next advantage from the card system is the benefit of having the supply records in a condition where the warehouse man knows absolutely what he has in stock, and can be governed accordingly in making requisitions on the purchasing department for additional supplies, thus keeping down the investment in mining

supplies to the lowest point consistent with good operation.

Another important advantage in a system of this kind is the readiness with which an inventory may be obtained at the end of the year, or for that matter, at any time during the year. All are familiar with the task of taking a complete inventory at the end of each year, when the weather conditions are very unfavorable, when no one knows just how the supplies are going to come out, when the closing work of the year makes it hardest to spare the necessary time, and when the time for taking the inventory is necessarily limited. If this system is carried out as it should be, and if the cards are checked continually with the actual material on hand, there should be no hesitancy about taking the card inventory at the end of the year as being actual record.

The benefits of a system of this kind would increase in direct proportion to the quantity of supplies necessary to be carried in stock or to the volume of supplies consumed. If the stock of supplies at any point is sufficiently small, so that the warehouse man can take a complete inventory of them quickly and accurately, a system of this kind would not have the same advantage that it would in a case where the stock of supplies is too large to permit of a quick inventory.

With the continued centralization of interests, the general-warehouse idea will undoubtedly receive more attention than in the past; and, as these general warehouses increase in number, a revision of the old warehouse system will have to be made to meet the requirements of the new conditions. It was with this in view that the sysem which has just been outlined has been adopted by some mines. It is true that it will cost a little more to use a system of this kind than it would to use some of the older and simpler systems in vogue; but the requisite additional labor should not be judged by the amount of detail which appears to be necessary from the above. It usually takes longer to explain how a piece of work ought to be done than it does to do the work when you know how; I have found this especially true in outlining a supply-card system—as you will all, undoubtedly, by this time, be willing to admit. The advantages of such a system more than offset any additional labor that may be necessary. The additional cost will be found comparatively small, for it is always quicker and more economical to do a thing right than to do it wrong.

Round leather belting is made by cutting the leather spirally from a large circular disk. This gives a long continuous strip; the cut is kept of even width by the use of a guide, and the square strip produced is made round by drawing through a die. Round belts of a diameter greater than the thickness of a hide are made in two-ply form, and riveted together.

Questions and Answers.

Behavior of Fluorspar in Smelting.

What is the action of fluorspar in a mixture for smelting, either in the assay crucible or in the blast-furnace? There has recently been some discussion as to this. Some chemists in Colorado report that by the addition of fluorspar to the flux used in assaying, they obtain higher results, but are unable to explain why. The superintendents of certain smelting works state that fluorspar goes through the blast-furnace unchanged, and require that assayers in reporting the analyses of ores containing calcium carbonate and fluorspar, give only the lime occurring as carbonate as the "available lime," excluding the calcium that may be combined with fluorine, on the ground that it does not serve as flux in smelting. T. P. R.

Answer.—Fluorspar is a powerful flux. There is an annual production of about 50,000 tons of the mineral in the United States, and its principal consumption is for fluxing purposes, especially in the iron and steel industry.

The use of fluorspar in metallurgy was first mentioned by Agricola, in 1529, who gave the mineral its present name, deriving it from a Latin verb meaning "to flow"; this was because of its property of rendering slags fusible at a low temperature. Silica, sulphates of lime and barium, and other refractory substances can be readily fused with fluorspar, but it shows little tendency to dissolve basic oxides. One part of fluorspar will liquefy about one-half part of silica, four parts of calcium sulphate, or one and a half parts of barium sulphate. These data are taken from an article by F. Julius Fohs, in *The Mineral Industry*, Vol. XII, p. 132.

The use of fluorspar is also thought to lead to an economy in fuel, aside from its powerful fluxing property; this is ascribed to some exothermic reaction in which it participates. The relative quantitative economy of fluorspar and limestone is in the ratio of 156 : 300, but in practice in iron and steel metallurgy one part of fluorspar may do as much as 10 parts of limestone. According to Foehr, the reaction between silica and fluorspar is expressed as follows:

$$2CaF_2 + 3SiO_2 = 2CaSiO_3 + SiF_4.$$

It is quite probable, however, that there are other reactions, including a direct formation of fluorhydric acid. Silicon fluoride, SiF_4, is itself a gas.

The easy decomposition and powerful fluxing action of fluorspar is well known to zinc smelters, who regard it as a highly objectionable impurity in zinc ore. It is decomposed in the roasting-furnace (wherein the temperature is only about 1000° C. as the maximum) with the evolution of fluorine vapors, which are destructive to the lead chambers if the roast-gas be employed for the manufacture of sulphuric acid (see Ingalls' *Metallurgy of Zinc*, p. 34, p. 213). In the retort, fluorspar is objectionable because of the highly fusible slags it leads to.

As to the functions of fluorspar, reference should be made to an article by Foehr in the *Mineral Resources of the United States* for 1889-90, p. 468. It is ordinarily too expensive to be used in the smelting of lead ore in the blast-furnace, but it has been so used, and is said to diminish loss of metal by volatilization, because of reduction in temperature of slag formation.

Abstracts of Official Reports.

Granby Consolidated Mining & Smelting Company.

This company owns and operates an extensive copper property in the Boundary district of British Columbia. The report is for the year ending June 30, 1905. The capital stock authorized is $15,000,000; of this there is $13,500,000 issued, the remaining $1,500,000 being held in the treasury. The company has no bonded debt.

The total production of metals was as follows:

	1904.	1905.	Changes.
Copper, lb.	16,024,415	14,237,622	D. 1,786,793
Silver, oz.	275,960	212,181	D. 63,779
Gold, oz.	54,231	42,884	D. 11,347

The president's report says that the production of copper bullion during the year showed a slight falling off, due entirely to the fact that no outside matte was purchased. Nevertheless the profit is considerably larger than last year, owing partly to great economies introduced during the year and partly to better average prices for metal.

The income account for the year is stated as follows:

Gross receipts, sales of metal, etc.	$2,749,145
Working expenses.	$1,797,964
Ore purchased.	238,532
Total expenses.	$2,036,496
Net earnings.	$712,649
New construction and equipment.	$343,974
Mining properties bought.	142,604
Total expenditures.	$486,578
Surplus for the year.	$226,071
Add surplus from previous year.	842,226
Total surplus, July 1, 1905.	$1,068,297

Working expenses include all costs of mines and smelter; also freight, refining, selling and general expenses. There was a decrease of $217,202 in gross earnings, with a decrease of $646,337 in expenses, leaving an increase of $429,135 in net earnings. The net earnings were equal to 5.3% on the outstanding capital stock. The expenses were about 9c. per pound of copper, after making full allowance for the gold and silver.

The report says that the new properties purchased during the year will facilitate the working of the mines owned by the company in the past and, with the ore reserves on hand, will satisfy the largely increased demand of the smelter for a long time to come. No benefit was derived during the last fiscal year from the opera-

tions of the two additional furnaces constructed, on account of unavoidable delay in operating them.

The mines, at which development work is constantly pushed, look well; the quantity of ore blocked out is largely in excess of that in sight last year. The smelting works are in a high state of efficiency. The company is entirely free from debt and, in addition to a large cash balance on hand, has further available assets in the shape of blister copper in transit from the smelter to the refining works.

Lake Superior Corporation.

The report of this Canadian iron mining and smelting company is for the fiscal year ending June 30, 1905. In this report President Charles D. Warren states that the company's income from all sources for the year amounted to $585,539, while the expenditure totaled $550,737, leaving a credit balance of $34,802. The company's liabilities are as follows:

Capital stock	$40,000,000
First mortgage bonds	10,000,000
Income bonds	3,000,000
Bills payable	800,000
Canadian Improvement Co.	4,677
Coupons unpaid (contr)	25,900
Due subsidiary companies	29,400
Suspense account	22,020
Profit and loss	34,802
Total	$53,916,799

The old indebtedness has been settled with the exception of a few disputed claims and a number of small accounts. When these are all settled, the balance of the treasury bonds for the uses of the corporation will probably be a little over one million dollars ($1,000,000).

Under the plan of reorganization the company received $1,000,000 in cash working capital, in addition to the material and supplies of the subsidiary companies. This sum was found to be inadequate, and it was necessary to have recourse to loans in order to purchase stock and materials.

Plans have been considered for extensions and additions to the plant which will materially increase the earning capacity.

The maximum monthly output of the rail mill was 12,138 tons. The product is of a high grade, fully meeting the requirements of the Canadian railways. The two blast-furnaces produced 11,997 tons of pig iron during August, 1905. Negotiations are pending with a view to deriving a satisfactory revenue from the nickel properties. Over 200,000 tons of ore were taken out at the Helen mine, and this, together with the stock on hand, and the output to the close of the shipping season this year, has been sold.

The operations of the wood department have not resulted satisfactorily, owing to the large dues payable to the Government, and to other matters incident to this work. A new arrangement has been consummated with the Government, and it is believed that the department will hereafter show fair earnings.

The pulp mill produced 27,817 tons of ground wood pulp during the year, the largest output in its history. Building paper and tar paper are also being made in increasing quantity. The Algoma Central & Hudson Bay railway and the Manitoulin & North Shore railway and the fleet of steamers were operated profitably. The two traction companies at the Canadian and Michigan "Soos" show some loss for the year, but it is expected will do better the coming year. The Tagona Water & Light Co., with a business of comparatively small volume, is one of the best properties, in proportion to the investment.

It has been a matter of serious concern that the power-house of the Michigan Lake Superior Power Co., 1,368 ft. long, is unable to bear safely the strain of the full head of water required to develop the maximum horse-power. An agreement, however, has been reached with the bondholders' committee representing the owners of the first-mortgage bonds of the Michigan Lake Superior Power Co. by which it will be possible to secure the amount required to place the power-house in a satisfactory condition.

The outlook for the current year is encouraging.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week ended Oct. 17, 1905.

801,842. COMPOUND FOR COATING IRON AND STEEL.—Nicholas A. Bibikov, New York, N. Y., assignor of one-fourth to Henry Connett, New York, N. Y.

801,848. EXCAVATING APPARATUS.—Hans Büchler, Zurich, Switzerland.

801,859. METHOD OF PRESERVING WOOD.—Willis E. Everette, Tacoma, Wash.

801,879. METHOD OF SEPARATING PYRRHOTITE FROM CHALCOPYRITE AND GANGUE.—John N. Judson, South Strafford, Vt.

801,921. ROCK CRUSHER AND PULVERIZER.—Archibald Scott, Carters, Cal.

801,947. MAGNETIC SEPARATOR.—John P. Wetherill, South Bethlehem, Pa., and Henry A. J. Wilkens, New York, N. Y., assignors, by mesne assignments, to Wetherill Separating Company, a corporation of New Jersey.

801,948. COAL OR ORE LOADER.—William C. Whitcomb, Chicago, Ill.

801,968. GOLD-SAVING APPARATUS.—John A. Clark, Yankee Hill, Cal.

801,981. OIL-WELL PUMPING APPARATUS.—Edward L. Gosse, Chanute, Kan., assignor of one-half to Louis A. Laughlin, Kansas City, Mo.

802,007. ROASTING-FURNACE.—Frank E. Marcy, Chicago, Ill.

802,012. METHOD OF SEPARATING NICKEL AND COPPER SULPHIDES.—Ambrose Monell, New York, N. Y.

802,030. BELL OPERATING AND CONTROLLING MECHANISM FOR BLAST-FURNACES.—John P. Coleman, Edgewood, Pa., assignor to the Union Switch & Signal Co., Swissvale, Pa., a corporation of Pennsylvania.

802,102. FURNACE.—James A. Herrick, Philadelphia, Pa.

802,131. METAL-HANDLING DEVICE.—Henry Aiken, Pittsburg, Pa.

802,133. GRAB-BUCKET.—Alexander E. Brown, Cleveland, Ohio, assignor to the Brown Hoisting Machinery Company, Cleveland, Ohio.

802,134. EXTENSION TRACK OR APRON FOR OVERHEAD TRAMWAYS.—Alexander E. Brown, Cleveland, Ohio, assignor to the Brown Hoisting Machinery Company, Cleveland, Ohio.

802,148. METHOD OF TREATING COPPER TOPS IN THE REFINING OF NICKEL-COPPER MATTE.—Robert R. Maffett, Bayonne, N. J., assignor to the International Nickel Company, New York, N. Y., a corporation of New Jersey.

802,151. TILTING FURNACE.—Francis H. Treat, Pittsburg, Pa.

802,153. PROCESS OF REDUCING METALS AND MAKING ALLOYS.—Henry S. Blackmore, Mount Vernon, N. Y.

802,170. MAGNETIC ORE-SEPARATOR.—Richard R. Moffatt, Brooklyn, N. Y., assignor to Imperial Ore Separator Company, a corporation of New York.

802,176. BLAST-FURNACE.—Samuel B. Sheldon and Alexander K. Hamilton, Buffalo, N. Y.

802,191. DRYING AND ROASTING FURNACE.—Charles E. Ballow and Ernest Stein, Guanacevi, Mexico.

802,197. COAL-DRILL.—William H. Clarkson, Edwards Station, Ill., assignor to Eluide J. Clarkson, Edwards Station, Ill.

802,210. SHAFT-LINING RING AND TUBBING.—Fritz H. Heise, Bochum, Germany.

802,229. CONVEYER.—Ovid D. Moses, Chicago, Ill.

802,242. METALLURGICAL FILTER.—Emma Stewart, Colorado City, Colo., administratrix of Charles Mannel, deceased.

802,263. STORAGE-BIN.—Alexander E. Brown, Cleveland, Ohio, assignor to the Brown Hoisting Machinery Company, Cleveland, O.

802,270. FURNACE-DOOR OPERATOR.—Hardin Deaderick, Bardstown, Ky.

802,331. DIFFUSION PROCESS.—Henry Schwarz, Longmont, Colo.

802,348 and 802,349. APPARATUS FOR MINING.—Ralph Baggaley, Pittsburg, Pa.

802,354. PROCESS OF SLAKING LIME AND LIME-CONTAINING SUBSTANCES AND CERTAIN NOVEL PRODUCTS OF SAID PROCESS.—Carleton Ellis, New York, N. Y.

802,357. BIN-GATE.—John Lawson, Copper Cliff, Canada.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week ended Oct. 7, 1905.

50 of 1905. MANUFACTURE OF MINE CAGES.—P. Thielmann & J. Meisenburg, Duisburg, Germany. Apparatus for making seamless rectangular iron frames for mine cages from weldless rings.

3,320 of 1905. MINE-CAR AXLE BEARINGS.—G. E. and W. Charlesworth, Barnsley, England. Improved pedestal bearings for the axles of colliery and mineral wagons.

3,820 of 1905. PROCESS OF MAKING OXYGEN.—H. Foersterburg and H. Philip, Perth Amboy, U. S. A. In the process of obtaining pure oxygen from peroxides of alkalies, first fusing the peroxide in a crucible, so as to obtain a homogeneous mass, and then immersing the cooled mass in water without the admixture of any other salts.

7,616 of 1905. PROCESS OF REFINING SULPHUR.—A. V. Cornillaux, Deville, France. For the purpose of refining sulphur which is recovered from substances used in the purification of gas, dissolving it in bisulphide of carbon and passing it over coke, which has the effect of removing all hydrocarbons mixed with the sulphur.

12,053 of 1905. SAFETY LAMP.—T. Thomas and D. E. Thomas, Porth, Glamorgan. Improvements in safety lamps, chiefly with the object of reducing the effects of explosions of gaseous mixtures inside the lamp.

12,533 of 1905. DUST REMOVAL.—E. Barthelmess, Neuss a. Rhein, Germany. A centrifugal apparatus for removing dust from blast-furnace gases.

13,350 of 1905. DEPOSITION OF NICKEL.—C. Langer, Swansea. In the process for depositing nickel from nickel carbonyl by passing the gas through vessels containing nickel pellets, at a temperature of 200° C., an improved shape of these vessels and improved method of heating them, in order to keep the temperature more even and regular.

13,613 of 1905. SILVER ALLOY.—A. E. Hobson, Meriden, Conn., U. S. A. An alloy of silver, containing 925 parts of silver and 75 parts of manganese, which alloy is more ductile and more easily stamped than ordinary sterling silver.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. Richard A. Parker, of Denver, was a recent visitor in New York.

Mr. Walter E. Koch, of Sta. Maria del Oro, Mexico, was in New York, last week.

Mr. J. W. Bible, of Hanover, N. M., has been spending a few days in New York on business.

Mr. Stebbins has recently returned from examining mining properties in Fresno county, California.

Mr. Howard Smith leaves San Francisco soon for professional work in Josephine county, Oregon.

Mr. T. S. Mathis, of San Francisco, has returned to Seattle from professional work in southeastern Alaska.

Mr. Chas. Janin, of the firm of Janin, Stebbins & Smith, of San Francisco, has completed examinations in Oregon.

Mr. J. W. Astley, of Rossland, has retired from the position of general superintendent for the Le Roi Mining Co., Ltd.

Mr. A. Chester Beatty returned to Denver a few days ago from a professional trip to Utah and southwestern Colorado.

Mr. Barton Sewall, vice-president of the American Smelting & Refining Co., visited the Utah plants of that corporation recently.

Mr. A. McCharles, of Sudbury, Ont., has left that district for the present, his health requiring him to seek a warmer climate for the winter.

Mr. S. R. Heakes, general manager of the Guysboro gold mines in Nova Scotia, is visiting Cobalt in the interests of M. L. Pratt, the Standard Oil magnate.

Mr. L. A. Jacobs, of Newcastle-on-Tyne, England, is about to take up an appointment in Bengal as manager of a mine under the East India Railway Company.

Mr. Frederick Grundy recently left the City of Mexico on his way to examine some mining properties in the State of Chihuahua. He will go from there to Los Angeles.

Mr. A. H. Lawrence, formerly at Morelos, Chihuahua, Mexico, is now general manager of the East Gwanda Mines, Ltd., at West Nicholson in Rhodesia, South Africa.

Mr. Chas. J. Bandmann, of San Francisco, leaves the last of October to take charge of large mining interests near Magdalena, Mexico, where he will remain for several months.

Mr. Thomas Johnson, president of the Johnson Coal & Mining Co., is at Grant hospital, Columbus, Ohio, where he went to undergo an operation. No serious results are anticipated.

Mr. John McCaw, of Sherbrooke, Quebec, has been visiting New York on business. Mr. McCaw is operating a copper mine near Sherbrooke, with excellent prospects of success.

Mr. T. J. Drummond, vice-president of the Consolidated Lake Superior Corporation, has returned to Montreal after visiting the Sault Ste. Marie, the Helen Iron mine and the Cobalt mining region.

Mr. H. W. Turner has resigned his position with the Marfa & Mariposa Mining Co., at Terlingua, Texas, and will take up work in the Northwest under Samuel Peacock, of the Ladd Metal Co., of Portland, Oregon.

Mr. F. E. Wright, of the United States Geological Survey, who with his brother, Mr. C. W. Wright, has been engaged in geologic work in southeastern Alaska, has concluded his field work for this year and returned to Washington.

Mr. J. W. McCune, for some years in charge of the Sloss-Sheffield Steel & Iron Co.'s Birmingham furnaces, has taken charge of the furnaces of the Woodward Iron Co., Woodward, Ala. He is succeeded by his late assistant, Joseph Dunn.

Mr. Norval J. Welsh, of San Antonio, Texas, late managing owner of the Jimulco copper mines, Jimulco, Coahuila, Mexico, has become identified with the interests of Mr. W. C. Greene as manager of the Santa Brigida group of gold-silver properties in western Chihuahua.

Dr. Wm. B. Phillips, recently head of the University Geological Survey of Texas, will shortly leave Austin for Terlingua in Brewster county, Texas. He expects to remain there for the winter, opening quicksilver mines for the Chisos Mining Co., and installing furnaces.

Mr. R. G. McConnell and his assistant, Mr. F. H. Maclaren, of the Geological Survey Department of Canada, have returned to Ottawa from Yukon Territory, in which country they spent the field-work season of the year in topographical, and general and economic geological work.

Mr. Philip P. Barton has been appointed general manager of the business and operations of the Niagara Falls Power Co., at Niagara Falls, N. Y. This appointment also includes that of general manager of the Niagara Junction Railway Co., and of the Niagara Development Company.

Dr. Robert Bell, acting director of the Geological Survey of Canada, reached Victoria, B. C., on Oct. 14, on his return from a visit to Dawson, Yukon Territory. He purposes visiting the mining sections of the Boundary and Kootenay districts of British Columbia before returning to Ottawa.

Mr. Barry Hogarty, formerly chief chemist at the Pueblo smelter, of the American Smelting & Refining Co., at Pueblo, has recently been appointed assistant superintendent of the same plant. The appointment is a just one and in the way of natural promotion for long service and proven ability.

Mr. G. F. Cairnie, late assistant engineer in connection with the Lac du Bonnet Power Co.'s work on the Winnipeg river, has gone to Mexico, having been appointed chief engineer of construction for the Mexican Light, Heat & Power Co., which will shortly construct an extensive hydraulic plant near Monterey.

Mr. Eugene Coste, of Toronto, returned this week from a protracted trip, during which he examined the region north of Sudbury in connection with iron and nickel prospects, and investigated the oil-field to the east of Edmonton, Alberta. He stated that in the latter locality there was much difficulty in making tests on account of the depth of the drift covering the deposits.

Mr. F. August Heinze recently visited Franklin camp, situated in the northeastern part of the Boundary district of British Columbia. The occurrence in this new camp of large bodies of copper-gold ore has lately been brought to the attention of several prominent mining and smelting men operating in the United States with the object of interesting capitalists in their development.

The Central Provinces Government, India, has awarded a mining scholarship at Birmingham University, England, to Baliram Panduram Mokadam. He was educated at Neill City high school, Nagpur, and was awarded a scholarship for two years at the Warora colliery. He recently pased the examination in Bombay prescribed for second class mechanical engineer, and is looked upon as a most promising student. Mr. Mokadam has taken up his residence in Birmingham.

Mr. W. Fleet Robertson, provincial mineralogist of British Columbia, returned to Victoria, Oct. 9, after having spent two or three months looking into the prospects for mineral development of the northwestern Caribou, western Omineca and eastern Skeena districts of the province. He leaves for Windy Arm, on the boundary line between northern British Columbia and Yukon Territory, from which neighborhood discoveries of rich mineral have been reported during recent months.

Obituary.

Professor Sylvester Dwight Judd, formerly an assistant in the United States Geological Survey and professor of biology at Georgetown University, killed himself at his residence near Baltimore, Oct. 22. He was 35 years old, and had been suffering from mental troubles for nearly a year.

The death has occurred of J. Scott, of Seaton Delaval, Northumberland, England, the only survivor of the original trustees of the Northumberland Miners' Association, at the age of 71. Mr. Scott was very well known in Northumberland

mining circles, and on his retirement from active work, three years ago, published a book entitled "Sixty Years of a Miner's Life," being a history of 60 years' work in the mine.

Richard H. Keith, aged 63 years, president of the Central Coal & Coke Co., the second largest similar institution west of the Mississippi river, and head of extensive coal, lumber and railway interests in a dozen different states, died at his home, Kansas City, Oct. 17. He was born in Marion county, Mo., was educated at the Masonic college at Lexington, and at 21 years of age was clerk of the circuit court of Pettis county. He was studying law with Judge John F. Phillips at the outbreak of the civil war, during which he served in the Confederate Army. He returned to Leavenworth in 1866, and in 1871 he went to Kansas City, where he remained the rest of his life. A widow, his second wife, and eight children, survive him.

Baron von Richthofen, Professor of Physical Geography in the University of Berlin, died in Berlin on Oct. 7, aged 73 years. This distinguished scientist and explorer was born at Karlsruhe, Silesia, and early in life took up the study of geology. After a course of study at the high school in his native city, he took courses in the universities of Breslau and Berlin. His first important work was the geological survey of the Predazzo district in the Tyrol, which was completed in 1850. In 1860 he published his celebrated studies of the geology of the Alps and the more important mountain ranges of Hungary and Transylvania. His famous visit to East Asia was undertaken in 1861 at the request of the Prussian Government, and he traveled through Japan, Siam, Java and the Philippines. In 1865 California and Nevada were visited with the purpose of studying the metalliferous districts in the Sierra Nevada. The American visit was followed by the publication of "A Natural System of Volcanic Rocks." The period 1868-1879 was spent in carrying out researches in China and other Eastern countries. On his return to Germany he published his treatise on "China," which remains a standard work on the geography and physical features of the country, and accepted the Chair of Geography in the universities of Bonn and Leipzig. In 1888 he was appointed to the Chair of Physical Geography in the University of Berlin, which position he held until his death. Baron Richthofen was almost continuously president of the German Geographical Society since 1873.

Societies and Technical Schools.

American Mining Congress.—The following addresses have been arranged for, so far, at the coming meeting in El Paso:

E. Lyman White, Colorado State Commissioner of Mines, on "Mine drainage districts."

Dr. Wm. B. Phillips, of Texas, on "Quicksilver deposits of the Terlingua district, Brewster county, Texas.

F. A. Jones, of Albuquerque, on "The mineral resources of New Mexico."

W. J. Thomas, chemist of the Bingham Mining & Smelting Co., Utah, on "Damages arising from Smelter Fumes, etc."

Wm. M. Porter, of Chicago, on "An Eastern exhibit of minerals and mining machinery, etc."

Hon. Marcus A. Smith, of Arizona, on "A national department of mines and mining."

Prof. Chas. J. Norwood, director of the Kentucky State Geological Survey (not yet advised of subject).

A number of miscellaneous addresses will be made by prominent persons, who are interested in the mining industry.

Massachusetts Institute of Technology.—A circular just issued by President H. S. Pritchett "to alumni and former students," is, in part, as follows:

"At a meeting of the corporation of the Institute, held on Oct. 11, a report was received from the executive committee advising the corporation that, in the view of the committee, the recent decision of the Supreme Court of Massachusetts relative to the land on Boylston street made it impossible for the Institute to take further steps in the plan of co-operation with Harvard University, which has been under consideration the past year.

"In view of the facts set forth, the corporation adopted a resolution instructing the executive committee to notify the authorities of Harvard University that the Institute found itself unable to proceed with the plan of co-operation, and to express at the same time the appreciation of the corporation for the fairness and courtesy with which the authorities of Harvard had joined in this common effort to solve a difficult question.

"The corporation further authorized the president to communicate this result to the alumni, faculty and friends of the Institute, and to invite their hearty co-operation in the future upbuilding of the Institute.

"This decision disposes not only of the matter of an alliance, but also, for some time to come, at least, of the question of a site. It seems clear that the Institute's home must continue to be, for a number of years, its present one, with such added room and buildings as may be found necessary and practicable. . . .

"Outside of the question of increased endowment, which is most pressing, additional land ought to be secured as soon as possible; a site for the Walker Memorial building must be provided and the building started as promptly as possible; and an additional building, such as a chemical laboratory, and the erection of one or two modest dormitories on our land in Brookline, adjoining the athletic field, would serve a great need of the student life."

Trade Catalogues.

Deming power pumps are illustrated and described in catalogue "G" of the Deming Co., Salem, O.

"Natural Ventilation" is issued by the National Ventilating Co., 1 Madison avenue, New York.

The Williamsport Gas Engine Co., Williamsport, Pa., issues its catalogue of gas and gasoline engines.

The Foos Gas Engine Co., Springfield, O., issues its catalogue No. 16, of gas and gasoline engines.

The Hardsocg Wonder Drill Co., Ottumway, Iowa, issues its catalogue entitled "The Wonder Air Hammer Drill."

The Henry Martin Brick Machine Manufacturing Co., Lancaster, Pa., sends us its catalogue of clay-working machinery.

The Ingersoll-Sergeant Drill Co., 11 Broadway, New York, issues its bulletin No. 2004, entitled "Stone Working Tools."

The Christy Box Car Loader Co., Des Moines, Iowa, issues "As Others See Us," an illustrated book of testimonials from its customers.

The Northern Electrical Manufacturing Co., Madison, Wis., issues its bulletin No. 51 (superseding sections of bulletins No. 30 and 35).

The Cincinnati Milling Machine Co., Cincinnati, O., issues its catalogue of milling machines and cutter grinders, dated August, 1905.

"Westinghouse Railway Apparatus" is a special publication issued by the Westinghouse Electric & Manufacturing Co., of Pittsburg, Pa.

Thos. Carlin's Sons Co., Allegheny, Pa., issues catalogue L, a descriptive list of contractors' supplies, boilers and engines for sale by it.

The Westinghouse Machine Co., East Pittsburg, Pa., is taking up the manufacture of storage batteries. It issues a small flyer on the subject.

Robert Wetherill & Co., Inc., Chester, Pa., issue two catalogues, one of Corliss engines of their manufacture, and the other of Berry safety boilers.

"The History of the Desert" is a pamphlet published by Frank L. Kreider & Bro., San Francisco, Cal., describing the Tonopah and Goldfield mining districts in Nevada.

The Buffalo Forge Co., Buffalo, N. Y., issues its catalogue No. BB 5 and No. PB 5, referring to volume blowers and exhausters, and to steel pressure blowers, respectively.

The Sullivan Machinery Co., Railway Exchange Bdg., Chicago, Ill., issues a pamphlet entitled "The Destruction of Henderson's Point," describing the essential features of this engineering work.

The Fairbanks Co., Broome and Elm streets, New York, issues its new cata-

logue No. 375, describing gas and gasoline engines of its manufacture. It also issues a catalogue of the Smalley marine gas engines, for which it is the Eastern selling agent.

Industrial.

The Bury Compressor Co., of Erie, Pa., will have one of its air compressors on exhibition at the Paris automobile show which takes place early in December.

The Westinghouse Machine Co., of East Pittsburg, Pa., has received within the last few weeks orders for gas-engines, ranging from 10 to 1,000 brake h. p.

Repairs to West End furnace at Roanoke, Va., have practically been completed, and the furnace will be blown in shortly. It has been out of blast for six months.

The Cambria Steel Co., Johnstown, Pa., has authorized an improvement which will more than double the size of its present forge plant. Much new machinery will be installed, chief among which will be a 1,000-ton hydraulic press.

A shipment of Murphy air hammer drills was made within the past few days by the Carnahan Manufacturing Co., of Denver, to the Camp Bird mines, near Ouray, Col., also one to the Delamar mines of Delamar, Nevada.

It is announced that the United States Steel Corporation will spend $2,000,000 in enlarging and improving the South Sharon coking plant. The concern was built at a cost of nearly $1,000,000, and was but a short time ago taken over by the H. C. Frick Coke Co. It is also understood other large expenditures are to be made in this district.

The Wellman-Seaver-Morgan Co. has just been awarded the contract to furnish for the Wheeling & Lake Erie railway at Huron, Ohio, a complete ore-handling plant, consisting of four Hulett ore-unloading machines, equipped with the Hulett excavating bucket. These machines will span four tracks and be built with a cantilever at the rear and a folding boom at the front or water side of the machine. The plant is to be completed by May, 1906.

The S. H. Supply Co., Denevr, Colo., reports the sale of one 20-stamp mill, including necessary engine and boiler capacity, and one 40-stamp mill complete with power plant, concentrating tables, amalgamating plates, etc., to Sonora, Mexico. This company has also made shipments of American air-compressors as follows: 5-drill simple machine to Sunnyside Coal Co., Colo.; 3-drill straight line to United Mines & Exploration Co., Central City, Colo.; 6-drill compound to Wyoming, and 8-drill compound to Arizona.

The Sullivan Machinery Co., Chicago, reports the shipment of one of its new class WX Corliss air-compressors to the North Carolina Granite Co., whose quarries are at Mt. Airy, N. C. This compressor is of the two-stage type, and the air cylinders are coupled to a Sullivan-Corliss cross-compound condensing steam-engine, especially designed for the purpose. The inlet air-valves on both high- and low-pressure cylinders are of the Corliss type, controlled by independent eccentrics on the engine shaft, and the discharge valves are of the automatic poppet type fitted into removable seats in the cylinder head. This compressor is rated at 2,000 cu. ft. of free air per minute at 78 revolutions per minute.

The Blaisdell Co., of Los Angeles. Cal., has recently closed a contract with the Tonopah Mining Co., of Nevada, for a complete installation of the Blaisdell system in the cyanide plant of the 100-stamp mill. Owing to the high cost of labor at Tonopah and the nature of the ore at this mine, it is estimated that the saving in the cost of filling and emptying the sand vats and stacking the tailing, together with the increase in extraction accomplished by the Blaisdell system, will amount to fully 50c. per ton of ore treated. The Blaisdell Co. has also well under way the vat excavators, distributors, tailing stackers and conveyors recently ordered by the New Modderfontein and Langlaagte Deep, of South Africa, and the Black Mountain Mining Co., Peregrina Mining & Milling Co. and the San Prospero Mining & Milling Co., of Mexico.

The Abner-Doble Co., of San Francisco, reports an order from the California Gas & Electric Co. for a 9,000-h.p. wheel for its de Sabla power plant. This machine will be similar to the 8,000-h.p. Doble wheel installed in the de Sabla plant last year and the three 8,000-h.p. Doble wheels recently completely and now operating in the new Electra station of the same company. The wheel will operate under a head of 1,530 ft. at 400 rev. per min. and will be driven by a single jet of water, thus making it the most powerful water wheel ever constructed for operation under a single jet. Another large order from the California Gas & Electric Co. calls for six 570-h.p. wheels for its Nevada City plant. These will operate under a 190-ft. head at 410 rev. per min. A 400-h.p. Doble wheel for operation under a 400-ft. head, equipped with jet deflector operated by a Woodward compensating governor, has been shipped to the Chancellor Gold Mining Co., Wenatchee, Wash. The La Grande Water Storage Co., La Grange, Ore., has purchased an 800-h.p. 1,150-ft. head, 600 rev. per min. Doble wheel, equipped with a Doble needle regulating nozzle for operation by a Lombard governor. Among other recent orders secured by the company are two double 1,750-h.p. wheels for the San Joaquin Power Co., Fresno, Cal., for operation under 385-ft. head; one Doble needle regulating nozzle for a large water-wheel for the Komata Reefs Gold Mining Co., New Zealand, and a double 700-h.p. water-wheel unit for Mitsui & Co., Japan, for operation under 210-ft. head, this order including the wheel complete, with Lombard governor and gate valve.

Construction News.

Nevada City, California.—The Buckeye mine at this place will instal a 10-stamp mill in the near future.

Gibsonville, Sierra County, California.—The Wild Boar mine, near this place, will instal an electric plant.

Tolland, Colorado.—The Jenny Creek Mining & Milling Co. intends to put up a mill on its property. B. F. Pyle is manager.

Pleasant Valley, Colorado.—The Pleasant Valley Mining & Milling Co. is to put up a 50-ton amalgamating and concentrating plant. R. L. Martin, Central City, Col., is manager.

Harriman, Tennessee.—The Winston Coal Co. is opening a new mine on Walden's ridge, near the Domestic Coal Co.'s workings. B. A. Treat and C. W. Harmon are interested.

Utah Junction, Colorado.—The plant of the American Zinc & Chemical Co., at this place, has been destroyed by fire. The loss is $75,000, and it is not yet known when rebuilding will begin.

Tintic, Utah.—The Yankee Consolidated Mining Co., operating in the Tintic, Utah, district, has postponed the building of a new mill until early next year. L. A. Amsden, of Salt Lake City, is manager.

Somerset County, Pennsylvania.—The Somerset Coal Co. is to carry out important work in developing about 24,000 acres of coal land in its Jenner field. The plans contemplate the building of a new power house and transmission lines for supplying current to the mines, a railroad connection to tap the various workings and extensive development work in the mines themselves. A number of new headings will be started this fall. C. W. Watson is president, and the main office of the company is at Baltimore, Md.

Tuscaloosa, Alabama.—The Tidewater Development Co. has been organized for the purpose of building an electric road through the mineral region of Alabama. The main line will be from Gadsden, Ala., *via* Birmingham, to Tuscaloosa, with numerous branch lines as feeders. At Tuscaloosa it will connect with a barge line to be established on Warrior river, and thus furnish a cheap mode of transportation to Mobile for coal, iron and other minerals. A 20-year franchise for the operation of the road through Tuscaloosa has been granted by the legislative council. It is proposed to have both the barge line and electric road in operation as soon as possible.

Special Correspondence.

San Francisco. Oct. 16.

The Big Creek Gold Mining Co., which recently bought the Golden Rock ditch, in Tuolumne county, is putting the property in good condition, cleaning out and repairing the ditches and flumes so as to supply various mines with water as soon as possible. That section of the State is usually without water for power at the mines for two or three months each fall. This is especially of interest at Groveland and Big Oak Flat, where the new water supply will guarantee full and continued operation of mines now idle for want of it. The crews at work in the established conduits and along the right-of-way have progressed so far with their labors that by Nov. 5 water will be down to a point known as the old sawmill, about eight miles from Groveland. To the latter place and Big Oak Flat but comparatively slight repairs are necessary. In view of this fact, mining men are now paying considerable attention to the mines of the Groveland and Big Oak Flat districts, feeling that the assurance of a full supply of water for eleven months each year means good service.

Geo. H. Magruder and Frank L. Neer, watchmen of the Anti-Débris Association, charged with attempted extortion by the secretary of the California Débris Association, have filed affidavits denying the charge. Capt. W. H. Harts, of the latter body, makes the charge that these men made overtures to certain hydraulic miners, asking the payment of $500 or more, in consideration of which they would see that the miners were not bothered with injunction suits preventing them from mining, and, in fact, could go ahead and hydraulic even without a permit from the Federal authorities in charge of hydraulic mining in California.

The new Fort Bidwell mining district, in Modoc county, still attracts some attention, although little can be done this season, as the snow has come and prospectors will not be able to do very much until spring. Numbers of locations have been made, but as yet they are all prospects.

A trial has commenced in the suit of Dix W. Smith, a stockholder in the Sunset Mining Co., of Oroville, Butte county, for an accounting of some $200,000, alleged to have been received by Geo. W. Rumble, manager of that concern. Rumble's operations caused the Federal authorities to prosecute him for fraudulent use of the mails, and he was convicted. He has charged that various persons in and out of official life, including State Mineralogist L. E. Aubury, are engaged in a conspiracy for his undoing, and he declares that on three occasions his offices were robbed, presumably by conspirators. The thefts resulted in the loss of the books and records of the company, which are now badly needed to throw light on the issues of the case. Mr. Rumble declared that he had no money left. He said that he brought $100,000 here from London, and at the time of the organization of the Sunset Mining Co. he lent it $10,000, which was expended for mines and equipment. This was in 1900, and in the following year he says he lent 60,000 more, which was given to a man named Henry Armstrong to buy mines for the company in Alaska. Armstrong was accompanied by a director of the company, and both died in the far north. Rumble does not know where the mines they bought are. The witness denied that the money received from the sale of the stock was paid out again in monthly dividends in order to boost the price and induce the purchase of more shares. Rumble, although convicted and sentenced to imprisonment and fine for fraudulent use of the mails, is still at large, having appealed from the decision of the court in a former suit. This suit is a new one.

The sale of the Harvard Mining Co.'s holdings in Tuolumne county has been made necessary by the fact that the stock was unassessable and that a small minority of stockholders refused to permit themselves to be assessed to pay the indebtedness, and provide a suitable working capital for the operation of the property. The mine will now pass into the hands of men financially able and willing to start the work and keep it going until the property gets on a paying basis. This is the history of a number of mines in California organized under the laws of other States or by non-residents. Through fear that a majority of the stockholders may assess the property and "freeze them out," numbers of men will only go into mines where the stock is unassessable. But in such mines the minority appear to control, since if they refuse to pay debts or pay up money sufficient to bring the mine to a productive stage, then the property must be sold to pay the debts, whether the majority of the stockholders so desire or not. California law does not recognize unassessable mining companies or corporations. If the mine is in debt and the stockholders of unassessable companies do not pay, the property has to be sold to pay such debts, whether the stockholders have unassessable laws in their corporation or not. And this is as it should be. Nonresidents may start to open a property, pay their bills duly for a time, establish credit, and then finally, simply because the money they paid in for their stock is insufficient to meet the obligations incurred by the manager or representative, refuse to be assessed to raise more money. In such cases the creditors would suffer were it not for the State law which protects them and makes the property itself liable for the debts. There are now some dozens of large mining properties tied up in this manner in this State. Even after being compelled to pay the outstanding liabilities some of the stockholders have refused to pay any more money to proceed with the development work, and the mine therefore lies idle.

Bisbee. Oct. 18.

The Hoatson shaft of Calumet & Pittsburg mine is going down at the rate of 28 to 29 ft. per week, and has now reached a depth of 480 ft. It is bottomed in decomposed soft material, which has much resemblance to that in which the Lowell and Briggs sank at corresponding depths and the indications are for ore at no great depth.

H. B. Sturtevant, of Duluth, Minn., has been made superintendent of the Lincoln Consolidated mines, situated about 30 miles southwest of Tucson, and is now taking charge. He expects to develop the mines very largely the coming season, and hopes to have them in shape for a smelter next year. The Twin Buttes Mining Co., which is now building a road to its mine, south of Tucson, has agreed to extend the road to the Lincoln. This mine is a probable producer of copper, silver, lead and gold.

The winze on the 910-ft. level of Pittsburg mine here is now down about 30 ft., and seems to be in ground that can be held; three trials were abortive on account of the nature of the ground. This winze is running down in an irregular and altered contact between lime and porphyry. It contains at all times stringers of red iron ore carrying carbonates of copper running from 5 to 15%, which seem to be widening into bunches. These stringers are not followed, but the condition of the ground is remarkably good. The main orebody, for which the winze is sinking, is yet about a week's work ahead. Water in this mine is remaining constant at about 2,700 gal. a minute, and sinking in the main shaft has reached the 1,130 ft. level, where the main drifts are to be cut.

In the Junction mine's 900-ft. level there has been ore for about 130 ft., some of it very low-grade leached material, but rich enough so that, when mixed in the muck piles with the better ore that has come in at intervals, the whole can be classed as pay ore. On the 1,000-ft. there is so far very little that shows ore, most of the drifts being in hard lime. The contact is pitching away to the northeast.

A diamond drill is to be started on American Development at once to determine formation. Two drills are working underground in Duluth mine, and both are showing more or less copper all the time, though for the past week the percentage of ore is rather too low to be of value.

In the Lake Superior mine, on crosscut 31, the entire breast is ore running from 20 to 30% copper, and the indications are that the find is important. Explorations in the Jessie claim, another part of the mine, are showing ore also. It is probable that much ore will be cut in the near future, as developments looking toward ore are now being vigorously prosecuted.

Sinking was resumed this week from the 1,100-ft. level, and 100 ft. will be added at once. On the 1,200 level lateral workings will be extended beneath the orebodies developed on the 800 to 1,100 levels. Another 100 ft. added to these orebodies will increase the tonnage of the mine materially.

Rumor here has it that the Calumet & Arizona group of capitalists have taken an option on claims close to the Glance property, seven or eight miles southeast of Bisbee. The Pittsburg & Hecla is said to have been taken over; but it is all very doubtful.

The Black Hills Copper Co., of Jerome, is sinking a 1,000-ft. shaft, the deepest in the district aside from that of the United Verde.

An assessment of 10c. per share, or $5,000, has been called on the outstanding stock of the Marquette & Arizona property, southeast of here, in order to patent the 800 acres of claims owned by the company. The rumors as to Cole group developments in that direction have caused this company to sit up and take notice.

Shattuck mine here is shut out of its lower level by water, and the holes through which it showed itself have been plugged. The mine is now an assured success, and looks like one of the large things of the Warren district. It was a brave undertaking and has succeeded.

Denver. Oct. 20.

The Trilby mine, located on Bull hill, has been sold to C. J. Billerbeck, Thomas Murray and Frank Maynard, the purchase price being stated at $150,000. This property is a very promising one, which has produced more than $100,000 worth of ore, while a large amount of development work has been done.

As had been predicted, the entire board of Gould directors was elected this week, at the annual meeting of stockholders of the Colorado Fuel & Iron Co., and the Rockefeller interests virtually retired from the active management. As Geo. J. Gould controls the Denver & Rio Grande railroad system and is consequently largely interested in the development of Colorado, our people are pleased with the result of the meeting. Eight subsidiary companies also held their annual meetings and elected their officers.

After Nov. 1 there will be only one railroad running into the Cripple Creek district from Colorado Springs, and the Short Line trains will run over the Midland Terminal tracks from Victor to Cripple Creek.

A significant feature of a large mortgage executed in favor of the Central Trust Co. of New York by the Colorado & Southern Railroad Co. is, that the latter company reserves the right to sell the Cheyenne & Northern branch, which runs from Cheyenne to Orin junction. There is a report current that the Burlington system is planning to build from Lyons, Colo., to Cheyenne, and is negotiating for the above-named branch, in which case they would have a direct line between this city and the Colorado Fuel & Iron Co.'s mines at Guernsey, Wyoming, whence large shipments of ore are made daily.

William Buett, A. G. Smith and C. L. Smith, all of this city, negotiated a sale of the Lone Star mine near Bluefields, Nicaragua, a few days ago, to parties residing at Bluefields, for $210,000 cash. The new owners intend to build a modern stamp mill on the property, which has produced about $250,000 taken out by a stamp mill for which the Smiths furnished the money a few years ago to Mr. Buett.

Another former Colorado mining operator, P. H. Heffron, has been murdered by Mexicans near Das de Bril, in the State of Chihuahua, Mexico, according to advices received by our United States Marshal. No particulars are known at this date.

An effort is being made to ascertain why a party of prominent Colorado Springs and Cripple Creek mining men, including Dr. B. B. Grover, of the former place, and P. C. Logan, who was for a long time superintendent of the Jo Dandy mine, are held prisoners in Sonora, Mexico, and the Federal Government will be appealed to if information in the matter is not received at once.

After being in course of construction for about two years, the large plant of the J. George Leyner Engineering Works Co. is completed, an important addition to the industries of this city. About 300 men will be employed.

Leadville. Oct. 18.

The Little Jonny mine is at present producing 7,000 tons monthly of a good grade of silicious ore; the sulphide bodies are not being touched. Recently one set of lessees working at No. 2 shaft opened a pocket of high-grade ore. The property has paid in dividends $12,000,000.

Governor McDonald, one of the large owners in the Penrose, visited the camp during the week. At the Penrose a large pump has been installed at the bottom of the shaft, the sinkers are being taken out, and a water column of 14 in. diameter is being put in; when this is completed two more pumps will be lowered; the water will then be controlled. At the Coronado about 300 tons of lead silicious and carbonate ore is being shipped daily; this quantity could easily be doubled if the smelters could take the output. To provide against accidents a reserve engine has been placed at the Coronado.

A noticeable improvement is seen in the downtown section, a number of shafts are being sunk. The Morocco shaft is being cleaned out and within a few days the management will be in a position to ship 50 tons of manganese ore per day. The Home Extension has nearly gained the requisite depth; when reached drifting toward the Cloud City will be started, and the connections made. In the two drifts of the latter property, the lime has been struck. The parting quartzite is just coming in, and another week's work should show a decided improvement in both drifts.

Yankee Hill, between Carbonate and Fryer, has taken on a new lease of life and several of the mines are turning out good ore. The Ponsardin, which has not been worked for seven years, started up during the week. At the 400-ft. level, a good body of ore was opened that runs 50% lead, and several ounces of silver per ton. After the mine is put in repair breaking ore will start. From the other properties, the Denver City, Forest City, Silver, etc., a fair grade of iron is being shipped daily.

A few days ago the Ben Burb, Rock hill, opened a good body of lead carbonate, similar in character to that found in the Reindeer, and is now shipping about 20 tons daily. There is no change in the big shippers from Rock hill, all sending out the daily quota of ore. The drifts of the Nil Desperandum are still in iron.

The Ballard, Breece hill, is shipping 1,000 tons a month from the lower levels of a fair grade of ore. In the upper workings a good streak of bismuth has been found that runs 12%; this ore is being sacked and stored awaiting a favorable opportunity to ship. In the lower level of the Bix Six, a good body of ore was found during the week; sufficient work has not been done to prove its extent; several carloads of ore have already been shipped; the returns being satisfactory to the lessees.

The shaft on the Ida May, Lake Park creek, is down 60 ft., where a small streak of ore was encountered; drifting has been started into the hill. The streak is 4 ft. wide and runs $20 gold per ton.

At the 950-ft. level of the incline on the Little Ellen, South Evans gulch, 250 tons monthly of $25 ore is being sent to the smelters. The principal value in the ore is in gold, although it carries a fair percentage of lead and silver.

Salt Lake City. Oct. 19.

The stockholders of the Keith-Kearns Mining Co. will meet, Oct. 31, to consider the matter of doubling the capital stock of the company. The purpose of this is to provide means for the purchase of adjoining ground and to pay off the present indebtedness of the corporation.

The Japan group of claims, near Alta, and in the American Fork district, has been sold to an Eastern syndicate, which will undertake to develop it on an extensive scale.

The Kennebec Mining Co., operating in the Big Cottonwood district, has purchased a control of the stock of the Gypsy Blair Mining Co., which owns an adjoining property. This will give the Kennebec a good foothold on the Alta side of the mountain.

One of the most noted mining cases ever tried in the courts of Utah came to an end during the present week, when the Supreme Court of Utah handed down a decision in the action brought six years ago by the Grand Central Mining Co. against the Mammoth Mining Co., which owns and operates mines in the Tintic district. The plaintiff, in the first place, sought to recover $300,000, alleged to be due because of the extraction of 6,000 tons of ore by the defendant from the Silveropolis mining claim, owned by the plaintiff company. The defendant set up a counter claim, alleging that the orebodies were in a vein which had its apex in United States lot No. 38, which is in Mammoth territory. The case was tried twice in the district court; the first time before Judge Higgins, and in his decision the Grand Central was the victor. A new trial was granted on application of the Mammoth by Judge Marioneaux; the case was tried, and again the Grand Central succeeded. The Supreme Court affirmed the ruling of the lower court. The case was hotly contested to the last, and both sides lined up with the best legal talent that could be obtained. The amount of the damages is yet to be fixed.

During the week about 500 acres of ground, near Pelican Point, in Utah county, was deeded to the Boston Consolidated Mining Co., together with certain valuable water rights. This was the site originally selected for the proposed Boston Consolidated mill.

Mining conditions are improving at Pioche, Nevada, and a move is on foot which may mean the consummation of a deal to include some of the old-time producers of that camp.

The re-opening of the old Flagstaff mine, at Alta, is soon to be undertaken, in accordance with the conditions of the existing option on the property.

That the troubles of the Utah Copper Co. will soon be settled, and that the company will proceed on a plan to carry out an improvement campaign that will meet the approbation of all shareholders, now seems certain. It will be remembered that the majority interests recently undertook to increase the capital stock of the company from 450,000 to 600,000 shares, of the par value of $10 each; also to float $3,000,000 worth of bonds, convertible into this increased capital stock of the company at the price of $20 a share within five years. This plan was objected to by the vice-president of the company, Col. E. A. Wall, and suit brought to restrain those in control from carrying out the undertaking, which, he alleged, among other things, was a scheme to defraud the minority shareholders by reducing their holdings; the further allegation being made that the raising of $3,000,000 was wholly unnecessary. The restraining order was granted. Col. Wall is now in New York conferring with the other interests. The American Smelters Securities Co. was to have taken the bonds if the original plan had been carried into execution.

At the annual meeting of the stockholders of the Lost Packer Mining Co., held in Salt Lake, the old board of directors was chosen, and organized by the selection of James Ivers, of Salt Lake, president; James T. Finlen, of Butte, vice-president. It was stated at this meeting that the new smelter at the mine, which is at Ivers, in the Loon creek district, Idaho, will be in operation soon.

Duluth. Oct. 19.

The Mountain mine, of the Mesabi range, takes its place this year as the largest shipper of any class of ore, with a record that will reach about 2,400,000 tons for the full year. It passed the 2,000,000 mark this week, and has about six weeks more to ship. This mine has been mining an average of about 1,200,000 tons a season for the past six years, and had shipped a total of 9,771,000 tons up to the close of 1904. The mine is a large open-pit property, and has had three and four shovels in ore all the season. It is the only shipper over the Duluth, Missabe & Northern road, aside from the Hibbing group and three mines at Virginia. That road has moved to this date 7,500,000 tons, of which the Lincoln and Oliver, at Virginia, have shipped about 250,000 tons each, and the Higgins, also there, 350,000 tons. All the rest, aside from the Mountain's enormous business, has come from the mines at and close to Hibbing.

Orders have been given the Pressed Steel Car Co. for 1,250 ore cars, of 100,000 lb. capacity, for the two United States Steel Corporation roads in Minnesota. The roads have also ordered 18 locomotives, 12 for freight service, all consolidation and of about 170,000 lb. on the drivers, the others for passenger and switch service. The Duluth & Iron Range road is to build a coal dock at its terminals, the dock to be unique in that it will have a 5,000-ton elevated pocket, into which cargoes will be unloaded and from which cars will be charged for shipment, the coal to be drawn out of the bottom of the pocket, as is ore. This pocket is about large enough to hold one medium cargo.

The Lincoln mine, at Virginia, will sink a third shaft on the western end of its property, to be used for increased shipments the coming year. This year's business from Lincoln will be about 250,000 tons.

Cleveland Cliffs Iron Co. has optioned some 2,000 acres on the extreme eastern end of the Gogebic range, near Wakefield, and is to carry on drill operations the coming winter on a considerable scale.

At the old Saginaw mine, near Norway, has been found a new deposit of high-grade ore that looks as though it was of much importance. A cargo or two will be shipped this fall, if possible. The shaft at this old mine is 350 ft. deep.

Caspian mine, on the Menominee range, is shown to have a very large deposit, for drill borings for 1,200 ft. along the formation has been bottomed in good ore. This is one of the Pickands, Mather & Co. mines.

Joseph Sellwood, of Duluth, has sold the last of the larger mine interests he has been operating on the Mesabi for some years. He has turned over to the Cherry Valley Iron Co. his interest in the Larue mine, on the western Mesabi, for the par value of the stock he held, or on the basis of $1,000,000 for the lease of the entire mine. Larue is a property that is now worked by the milling system, and contains about 5,000,000 tons of good bessemer ore, running low in moisture. It is under a 20c. lease, and there is an annual minimum of 100,000 tons. The mine will probably make an annual output of about 200,000 tons. It is owned in fee by the Mississippi Land Co., an association of lumbermen, who secured the tract on which the mine was afterward found, for its pine timber. A third interest in the Larue is held by certain shipping interests as a lever for tonnage. The Cherry Valley Co. also owns the Croxton, which it bought of Sellwood a few months ago, and the Jeffrey, which is an unopened property, secured some time ago.

The electric haulage plants of the Queen and Fayal mines, of the Oliver Co., are to be identical, and each is to consist of one 100-kw. direct-connected generator and 14 by 30-in. Corliss engine, all by the General Electric Company.

There are now 49 operating shafts on the Gogebic range, all of them fairly deep, probably averaging about 600 ft. The deepest operation in the district is that of the Newport, which is down to 2,000 ft. Large exploring and developmental operations are under way in the east end of the region, as well as on the Wisconsin end, between Montreal and Shores. These are by large consuming and mining companies, and will be pushed with skill and vigor.

Biwabik mine, in one 10-hour shift, a few days ago, loaded 12,500 tons of ore, with three shovels working part of the time only. This is one of the best records ever made on the Mesabi range. This mine will pass the million-ton point by considerable this year.

Utica mine, of Pickands, Mather & Co., near Hibbing, is now shipping from the open pit for the first time. It has been an underground mine heretofore, and the removal of the overburden was notable from the fact that it was the second time the same earth had been handled, the first being when it was taken off the Mahoning ore and dumped on what afterward proved to be the Utica mine.

On sections 2 and 3, 55-25, a large body of iron ore has been found by explorations by the Oliver Iron Mining Co. This is

on the west end of the range, only four miles from the Mississippi river, and will be reached by the new line of the Duluth, Missabe & Northern road.

The Cleveland Cliffs Iron Co. is building an engineers' office at Ishpeming, where it will have headquarters for all its engineering operations. On the third floor will be a club, with dining rooms, kitchen, etc., for the use of employees. The grounds are being beautified under the supervision of a leading landscape architect of Boston.

A 40-acre tract in section 20, 26-25, has been taken over by the Oliver Iron Mining Co.; after exploration, there showed a body of sandy ore. One hole is about 200 ft. in ore, and many others have cut the ore deposit for more or less depths.

Calumet. Oct. 14.

Lake Superior mines produced upwards of 19,250,000 lb. refined copper in September, the largest month's yield on record. At no time in their history have lake mines been producing on a greater scale than at present and the strong copper market, which has ruled for the past several months will make 1905 one of the best years ever experienced in the Michigan district. Lake mines are now turning out the metal at the rate of approximately 235,000,000 lb. per annum and there are indications of increased output at many points.

Arrangements have been completed for the installation of a larger hoisting engine at No. 2 shaft of the Osceola Consolidated Mining Co.'s South Kearsarge mine. The concrete foundation is being laid. The hoist in use at No. 2 shaft of the North Kearsarge mine when that opening went out of service, has been repaired and will be used. The steam cylinders were rebored and a new drum has been shipped from the plant of the Nordberg Manufacturing Co., at Milwaukee, Wis. The drum is of the straight-face type and will have a capacity for 2,000 ft. of cable. No. 2 shaft will reach the boundary line at a depth of 2,000 ft., so that the hoist will be sufficient to meet all future demands. As soon as it is in commission, a much larger production will be possible from that source.

An accident at No. 1 shaft of the Osceola's North Kearsarge branch badly damaged the skip-road and rock-house and it will take several days to complete repairs. During the interval hoisting will be discontinued, but an increased output from the other shafts will prevent any material falling off in the rock shipments of the entire property. Owing to the skip leaving the track at one of the upper levels the shaft was damaged. The skip was pulled through the rock-house, demolishing a portion of it, and knocking down one of the pulley stands.

C. A. Wright, of Hancock, president of the Keweenaw Copper Co. and its subsidiary concern, the Keweenaw Central Railway Co., is in Chicago. It is understood that he is purchasing rolling stock for the railroad. Contracts for the steel and ties were let some time ago, as also the contract for the grading of the last division of the road from the Cliff to the Mohawk mine. It will not be possible to build the road beyond Mohawk this year, owing to the lateness of the season; but connection with the Mineral Range road can be made at Mohawk, both for freight and passenger service. The steel and tie construction of the road will be started immediately, the locomotive purchased from the Copper Range having been secured for use in this work.

There has been considerable improvement in the outlook at the Adventure mine in Ontonagon county in the last few months and hopes of putting the property on a sound basis permanently are once more entertained. In September 135 tons of mineral were produced, the rock stamped averaging 17 lb. ingot copper to the ton. Cause for the Adventure's better showing is to be found in the improved openings east of No. 3 shaft, where the Knowlton lode is yielding a good grade of rock. The management has placed a diamond drill on the property in an effort to determine the extent of the workable ground above the fifth level east of No. 3 shaft, and if the indications are sufficiently promising, the drifts on the upper levels will be extended to tap the territory. Sinking in the new No. 4 shaft is down to a depth of 20 ft. and the lode shows encouraging values.

A small force is at work on the Ashbed property, in Keweenaw county, where operations were resumed a short time ago, after a few years' idleness. Sinking is being carried forward from the old tunnel level. While considerable copper has been encountered and the work at times shows promising conditions, the values are widely scattered, and the copper courses are not strong enough to hold for any length.

Michigan's output last month, 178 tons, was the largest in its history. Recent improvements in its portion of the Mass mill have effected a much better saving in the finer grades of mineral. Work in the old Rockland shaft, which was unwatered a short time ago, is going ahead steadily. As soon as the diamond drill taps the old workings on what is believed to be the Branch vein, they will be drained in order to permit a careful examination.

There has been improvement lately in the grade of rock forwarded to the mill from the Mass mine. This is exclusive of the mass and barrel copper, the production of which is considerably larger than a few months ago. The improvements to the stamp mill at Keweenaw bay have increased its capacity to 1,200 tons of rock daily. The Mass is meeting its extraordinary expenses, which consist of providing machinery and surface equipment and the opening of the new C shaft, from current earnings.

Platteville, Wis. Oct. 14.

The Wisconsin, Illinois and Iowa zinc-field, locally known as the Platteville zinc and lead district, extends north as far as the Wisconsin river and south to the State line, taking in a strip of the northern part of Illinois, and to the west as far as the Mississippi river, including that portion of Iowa adjacent to the river opposite to southwestern Wisconsin and northwestern Illinois. The eastern boundaries have not as yet been determined.

A company has been organized by local men, with the object of prospecting for zinc and lead in the Jack Gardner range, about four miles north of the city of Monroe, Wis. A. S. Douglas is president.

The Grunow Mining Co. has opened up a solid bed of zinc ore, 14 in. in thickness, just below the glass rock. This strike is in entirely new ground, and is on a range running directly across what is locally known as the Bainbridge property in the Mifflin camp. The company has loaded 250 tons of ore, mined during the past few weeks.

The Empire Mining Co., located in the Platteville camp, is producing 21 tons of zinc concentrate and 3⅓ tons of lead ore, per shift of 9 hours. The workings are about 35 ft. above the oil rock, and as the orebody in the Platteville district extends to the oil rock, and in some places below it, the Empire people figure they have many years' work in sight. The company's stock is steadily advancing in value, and at the present writing $850 is bid, with no one willing to sell; this is on a basis of $425,000. The original cost per share was $62.

The Murphy Mining Co., whose property is located in the Hazel Green camp, adjacent to the Square Deal and Mills Mining Co.'s property, has done some extensive drilling during the past year. During the past week a shaft opened up a rich vein of zinc ore, which is heavily loaded. The property is owned and controlled by local and Pennsylvania people.

The Square Deal Mining Co., in the Hazel Green camp, has also been doing considerable prospecting work during the last summer, and has been fortunate in opening up what seems to be a paying property. It has discovered a large body of zinc and lead ore in sinking the main shaft. It is reported that this company recently purchased what is known as the Trego mill, at the Meeker's Grove camp.

Considerable prospecting has been done in the neighborhood of Warren, Ill., located in the northern part of the State, on the Illinois Central railroad, near the Wisconsin State line during the past season, a number of the citizens of Warren being interested. Prominent among the prospects is the Lucky Dime mine, situated just south of the city. In sinking the shaft, large quantities of iron pyrite and some lead ore were struck.

Considerable excitement was recently

occasioned in the neighborhood of Hanover, just south of the Wisconsin State line, by a reported find of oil. The whole of the Wisconsin and Illinois territory is underlaid with what is locally known as an "oil rock," being found from a few inches to several feet in thickness. At different places it is highly impregnated with oil. Several parties have prospected this oil rock with varying results.

A company has been formed to prospect for oil at Sand Prairie, on the Mississippi river.

Scranton. Oct. 23.

Umpire C. P. Neill, under the Anthracite award, has rendered a decision in two important cases, one being a victory for the operators and one for the miners. The contract miners employed in the Ontario mine of the Scranton Coal Co. contended that up to 1902 they were paid $2 per yard for taking down rock to make height for the cars, and that after the award of the commission this was increased to $2.20 per yard. In August, 1904, this was reduced to $1.93, $1.75 and $1.50 per yard, according to the conditions which prevailed. At the hearing before the Conciliation Board the company showed that the rock was between two veins which afterward ran into one. The umpire refused to sustain the grievance, as the case was one to which the award of the commission was not applicable. The contract miners of the Delaware & Hudson Co., at the Plymouth colliery, contended that before and after the award they were paid 50c. per yard for lifting bottom bone, and that in September, 1904, the company notified them that this payment would cease, unless the bone exceeded 8 in. in thickness. The miners complained to the Conciliation Board of a reduction. The umpire decided that whenever a miner cannot avoid taking the bottom bone along with the coal he is entitled to 50c. per yard, but he must not remove the bone without orders from the company. The latter decision is regarded as somewhat indefinite.

Rather than sell their old powder tins to the powder companies, the miners of District No. 1 of the anthracite region have decided to destroy all the empty tins. This was the decision of the convention held in Pittston, and it is an unfortunate one. The price of the empty powder tins from April 1, 1885, to August 1, 1901, was 8c., and at the latter date this was raised to 10c., but after two years' trial the powder companies found that the price was higher than they could afford to pay in comparison with the cost of new tins, and notified the miners that the old price of 8c. would be reverted to, and at present this price is uniform throughout the region. The proceeds from the sale of the old tins have for many years been paid into the treasury of the "Keg fund," which has beneficial features and was very useful to relieve sick or injured miners. The loss of this revenue will practically render useless the keg funds throughout the region.

Judge Lynch, of Luzerne county, has granted a preliminary injunction, restraining the Kingston Coal Co. from mining under St. Vincent's cemetery, in that town. It was contended that if the operations of the company continued under the cemetery the bodies would fall into the mine workings.

One of the most unfortunate and uncalled for strikes in the anthracite region is that at the collieries of Markle & Co., at Hazleton, referred to in last week's JOURNAL. A young Hungarian quit work because the company refused to pay the wages he demanded and now more than 1,000 men and boys are idle, and from all appearances will be idle for a long time. The company has taken measures for a prolonged battle, the windows and doors of the breakers being boarded up, and the mules being removed from the mines to stables, which are being specially built at Jeddo. Railroad companies have also been notified to remove their cars from the mine tracks. One of the management pointed out that the company would not be justified in making any concessions at this time, owing to the agreement entered into when the award of the Commission went into effect. The creation of the Commission, he said, was not the desire of the operators, but was asked for by the miners, and the case was a proper one for the Conciliation Board. Why the men did not take the matter before the Board instead of striking is a question that cannot be answered. The grievance cannot be entertained by the Board while the men are on strike.

Rumors have been prevalent that the Philadelphia & Reading Co. was making an effort to buy out the Markle Bros. collieries, the only individual operators of any importance remaining in the anthracite region. General Manager Richards, of the Reading, when asked as to the truth of the report, remarked that "it was news to him."

Foreman A. W. Baker, of the Buttonwood colliery, claims to have invented a new mine-cage safety-clutch, which, while superior to all those now in use, will do away with the danger of a broken rope entangling itself in the dogs and preventing their safe application in the shaft timbers where they should sink to prevent the fall of a carriage. The feature of the new invention, which has been patented, is that the dog arms are fastened to the nut of the spring box and to the bell crank of the dog-shaft and have no connection whatever with the rope above the hood. The spring with which the dogs are operated is enclosed in a spring box which has a depth of 6 in. instead of 2¼ in. play, as in the old style, and the spring itself will bring a pressure of 2,200 lb. to bear upon the dogs when the cage is released. The whole device is under the canopy and there is no possible manner by which a broken rope could become entangled with it.

Toronto. Oct. 20.

With the advance of the season, prospecting in the Cobalt mining area is rapidly drawing to a close and many miners are returning. Work will be resumed in the spring under considerably more favorable conditions and with better chances of success, owing to the wholesale cancellation of a large number of fraudulent claims, covering some of the most promising territory in Coleman township and the adjacent townships of Bucks and Lorrain. These claims had been staked out without any real discovery being made. A large area, temporarily locked up, will be thrown open next spring by the cancellation of claims; the dispossesed claimholders have twenty days to file protests. Most of the territory not covered by genuine claims is soil covered and heavily timbered. It will require much heavier and more detailed work than was necessary in the case of the rock exposures, where most of the rich discoveries were made.

Shipments are being made from the J. B. 8 mine, lying between Glen and Giroux lakes, and owned by H. L. Kerr, W. J. Blair and George Glendinning. It adjoins the Foster property, one of the most valuable in the area; eight veins have been discovered; the most valuable averages 8 in. in width.

D. D. Mann, the Canadian Northern Railway magnate, has purchased two claims at Cross lake. Mr. Mann is largely interested in silver mining in British Columbia, and has sent to that province for skilled miners to begin operations upon his Cobalt investment. A recent estimate gives the number of men employed in the Cobalt mines at about 450. The Timiskaming & Northern Ontario railway commissioners are considering the advisability of extending the railroad from Cobalt to the district between Kerr and Giroux lakes, a distance of about three miles. This would give direct access to several valuable mines.

Reports are again current as to the discovery of diamonds in New Ontario. A number of rock samples, supposed to contain diamonds, were recently received by the Dominion Geological Survey, but upon examination proved to contain nothing more valuable than garnets. The officials of the Survey are interested in the subject, and will keep in view the possibility of locating in this vicinity the source of diamonds found in the glacial drift in Wisconsin and Michigan. Dr. A. P. Low, in a note published in the Geological Survey's Report for 1898, says that special observations on the glacial striæ and drift on Moose river confirm the view that the ice moved in a southwestern direction

from Hudson bay. Director Gibson, of the Bureau of Mines, states that so far he has not learned of the discovery of any diamonds of gem value in Ontario.

The staff of the Canadian Geological Survey are returning from this summer's explorations. W. McInnes, who worked in the region at the headwaters of the Winisk river and Trout lake, found that geologically the country is similar to the better-explored territory to the south. It is composed of gneiss, granite and large belts of so-called Huronion rocks. In one locality the rocks were identical with the nickel-bearing formation of Sudbury. Mr. McInnes, however, did not find any sulphides indicating the presence of that metal.

The Northern Oil & Gas Co., operating for petroleum near Manitowaning, Manitoulin Island, drilled in a well last week. While the pumps were at work the oil overflowed and gas broke loose. When control was obtained, oil continued to run at the rate of 400 barrels per day, with gas at 2,500 lb. pressure.

The Dominion Coal Co. has erected coal pockets at St. John, N. B., and Halifax, N. S. The amount of coal supplied by them to the Dominion Iron & Steel Co. has been increased from 40,000 to 60,000 tons per month. They have made a contract with the Maine Central Railway calling for 75,000 tons for winter shipment. The coming winter is expected to be the busiest in the experience of the company.

The Anglo-Canadian Graphite Co., of Buckingham, in the Ottawa district, has assigned, with large liabilities. A meeting of creditors has been called for Nov. 7, at Hull, Quebec.

The following mining companies have been incorporated under the laws of Ontario.

Coleman Development Co., Limited; head office, Haileybury; capital, $300,000; provisional directors—James F. Gillies, Ralph R. Little and John McKay.

Port Colborne-Welland Natural Gas & Oil Co., Limited; head office, Port Colborne; capital, $50,000; provisional directors—Thos. F. Waik, William J. Best and Frank K. Brown.

Victoria, B. C. Oct. 9.

The president of the Great Northern Railway Co., when visiting Vancouver, recently, announced that construction work work on the western section of the Vancouver, Victoria & Eastern railway is to be commenced during the ensuing winter and be proceeded with expeditiously. The starting point will be Cloverdale, on the New Westminster & Southern, connecting New Westminster, B. C., with the Great Northern Co.'s line, thence to Seattle, Washington. While there is now comparatively little importance placed on the completion of this railway by mine-owners in southwest Kootenay and the Boundary, as other railways afford them transportation, the completion of the through road will materially assist in the opening up of mining camps in the Similkameen. Further, the coal measures of the northern Similkameen and Nicola country will be made accessible by the construction of the Canadian Pacific Railway Co.'s branch line from its main line at Spence's Bridge southward to Nicola. At present there is only one productive mine throughout the large area the new railways will tap, the Nickel Plate, near Hedley, owned by the Marcus Daly estate.

Other properties on which much work has been done are the Sunset, on which the B. C. Copper Co., of New York, has had some 30 men engaged in underground prospecting, with good results; a big group in Voigt's camp, with an extensive surface showing stripped and some underground work done; and another group at Olalla, which W. C. McDougall has been prospecting for several years.

Slocan.—The Bosun mine, on Kootenay lake, has been acquired by the Monitor & Ajax Traction, Ltd., of London, England, the purchase consideration having been the issue to the Bosun Mines, Ltd., another English company, of 26,000 of the Monitor & Ajax Co.'s ordinary shares of £1 each and 6,666 deferred shares of 1s. each. The Bosun property consists of 8 mineral claims situated near the east shore of Slocan lake. The Bosun was the first mine in the Slocan district to ship zinc ore, of which it sent about 1,900 tons to Belgium. The zinc ore from this mine carries high silver values, much of it averaging 80 oz. per ton. None of that shipped contained less than 50 oz. per ton. Nearly 3,000 tons of galena ore were also shipped prior to the suspension of operations two years ago. The Bosun lead is described as a large fissure vein of quartz, with galena and argentiferous zinc blende. It has been developed by six adits, with connecting raises. The mine was opened up by Capt. W. H. Sandiford, who remained in charge until low prices necessitated a close-down. The Monitor & Ajax Co.'s Monitor mine, near Three Forks, Slocan, has been developed by five adit tunnels. More than 3,000 tons of galena ore have been shipped, this having netted about $200,000. But little development or production has taken place during the last two years, but machinery has been installed, a flume line built and other preparations made for further work. The company has constructed, near Rosebery, on Slocan lake, a plant for the separation and recovery of the zinc blende which occurs with the galena to such an extent as to have been a cause of penalty at the smelter. This plant is about ready for operation.

Frank, Alberta.—The strike declared on Sept. 5 by the United Mine Workers of America against the Canadian-American Coal & Coke Co., at Frank, has been settled by a compromise agreement in regard to the check-off system, which was the main cause of the trouble.

London. Oct. 19.

The Tomboy Gold Mine, of Telluride, Colo., is one of the English-owned mines about which little seems to be known in Colorado, or in the United States generally. The mine was acquired from the American owners by the Exploration Co., of London, in the late Hamilton Smith's days, in 1899, and was sold to the Tomboy Gold Mines Co., Ltd., for £300,000 in shares. As the mine was a going concern and had funds in hand, no other capital was required for the working of the mine. Like some other mines, the Tomboy showed signs of exhaustion, but James Herron, the manager, wisely obtained an option on the adjoining property, the Argentine, and out of the production during the time the option ran entirely paid for its purchase. In 1903 the Mountain Chief claims, also in the immediate vicinity, were purchased for £20,000. When this latter purchase was arranged for, it was also decided to spend additional sums on developing the Argentine and Mountain Chief properties and to increase the milling capacity from 60 to 120 stamps. Owing to the labor troubles at Telluride, the extended scheme has not yet matured. Up to the present time the development of Mountain Chief has been more or less kept back. At the Tomboy mine, a little is still being done by tributors, but the income is small. During the year ended June 30 last, the whole of the ore milled came from the Argentine, amounting to 103,000 dry tons. The mills recovered $484,500 and the concentrates brought $253,000; with other items the total receipts were $755,800. On the other hand, the costs were $530,000, leaving a profit of $225,000. After providing for London expenses, depreciation, etc., dividends amounting to £30,000 were distributed on the year's work. Since the formation of the London company, dividends amounting to £135,000 —that is, 45% of the capital—have been paid. As regards the future, nothing very definite can be said. A large amount of development is being done at the Argentine, some of which has given good results, but it is impossible to make any estimate of ore reserves. The ore milled during the past 12 months has been of comparatively low grade, yielding only a trifle over $7 a ton, and giving a profit of $2 a ton. With the continual discoveries at the Argentine and with the Mountain Chief, at present in reserve, the company promises to pay steady, if small, dividends for some time to come.

The Caucasus Copper Co. was formed in 1900 to acquire mines in the south of Russia. The chief shareholders are bankers in the city of London, and Pierpont Morgan is said to have had also a large interest in it. The ore deposit is very extensive

and consists of a mixture of chalcopyrite and pyrite in a silicious gangue running about 3% copper, with no gold or silver values. On crushing, the sulphides go chiefly to slime, and no concentrating table is of any assistance. At first, an attempt was made to smelt the ore without concentration, but owing to the great cost of fluxes and the low grade of the ore, this method was soon abandoned. Since that time, matters have been in the hands of Messrs. Knox & Allen, of New York, and Mr. Van Liew, of Anaconda. The solution of the problem which they propose is to adopt the Wetherill system of magnetic concentration, the European rights of which are in the hands of the Humboldt Co. at Cologne. After considerable experiment at the mine, sufficiently good results have been obtained to warrant, in the absence of any other possible process, the erection of plant on a large scale, sufficient to treat 1,000 tons a day. In order to provide the necessary cash, and also in order to pay off loans, it has been decided to issue £500,000 in 6% loan ecrtificates. When the company was floated the nominal capital was £500,000, of which £400,000 in shares went as purchase price and £100,000 was subscribed as working capital. All this money has been spent on plant, exploration and experimental work; in addition, another £190,000 advanced by the chief shareholders has gone in the same direction. Part of the new loan certificates will go to the lenders of the £190,000, and the remainder will be spent on the new concentrating plant. The future of the company will be looked forward to with considerable interest by mining engineers and metallurgists.

Paris. Oct. 10.

The mining world here is paying attention to the fact that importations of coal into France are steadily on the decrease, and that for the first six months of 1905 a decrease of 500,000 tons is observed from the figures for the same period of 1904. The total imported coal for 1905 amounts to about 5,000,000 tons, in round figures, of which only some 3,400 tons were from the United States. This figure, however, is an increase of 3,100 tons over 1904, as only 300 tons were then imported from the States.

Disappointment has been met with in the coal borings in the English Channel (Pas-de-Calais), and the results have been far from encouraging, yet considerable hope is now expressed regarding the results from the newly discovered field of the Lorraine. There are 11 seams discovered, varying in thickness from 2 to 5 ft., and the depth is not excessive, varying from 500 to 1,000 meters.

There is a field in many French mines for the application of electric rock-drills. At the present moment there is nothing very salable on the market. During the past five or six years some installations of electric drills of German make have been made, but the results have been far from encouraging, due to the poor quality of the material.

The passage of line No. 4 of the Paris Metropolitan Railway beneath the Seine is of interest, in view of the system employed for the boring of the tunnel. The contract for this tunnel has just been awarded, and the work is to commence at once. The process is known as the "freezing process," by which the parts through which the tunnel is to be pierced are artificially frozen sufficiently to enable work to proceed without caissons or shield, avoiding the use of compressed air. A small tube surrounded by several others certain distances therefrom is placed in position parallel to the axis of the tunnel, and the freezing mixture circulates therein. After a certain time the surrounding parts are sufficiently hard to permit boring to take place. The process has not before been used for horizontal boring, though it has been employed in sinking shafts.

The *Journal Officiel* recently contained an authorization for the employment on French railways of cars of 40 tons capacity for the transport of minerals. The provisional authorization was granted about a year ago. Previously the 10-ton cars, or *fourgons*, were the largest in use on French railways.

As an example of the impositions under which Paris contractors work, it is to be noted that the Metallurgist Syndicate of Paris has just addressed a protest to the Minister of Commerce and Finance against the new city import duty, or *octroi*, voted by the Paris Council about a month ago. This duty included a tax of 3.60 fr. per 100 kilograms on metals destined for any construction whatsoever within Paris, and an extension of the existing duties on girder and other irons and sheet iron. It must be remembered that this tax is quite distinct from the already severe taxes borne by material of this nature entering on French territory.

Johannesburg. Aug. 29.

A disastrous fire broke out on the Wolhuter Gold mine a few days ago, causing the loss of the boiler plant and the reduction works. The exact figure of the loss has not yet been published, but no doubt it will come to £150,000. The buildings and machinery were covered by insurance, but the indirect loss to the company, due to enforced idleness for eight or nine months, until a new plant is ready, will be very heavy. The fire seems to have been caused by the use of too heavy fuses on the switchboard.

The Wolhuter is a mine near the center of Johannesburg. It is rather a low-grade mine for its situation. A year ago the outlook was discouraging, losses being chronicled every month. Under the energetic management of Mr. Robertson, the mine has steadily improved, so that monthly profits of over £6,000 were recently made. Fortunately, the fire did not occur during the period when losses were recorded, for it might have been difficult to raise money for the new reduction plant. Confidence in the Wolhuter has been restored. No time will be lost in clearing away the débris, to make room for the new plant. Development work underground will be pushed ahead, so that when this mine resumes operations, its position will be better than it was before.

The loss by fire on the mines of the Rand has been very heavy during the last few months. A short time ago the crusher-house and main headgear of the City & Suburban mine was burned down; there was a bad fire in the compound of the Village Main Reef mine; at the Primrose mine the shops were destroyed, involving a loss of £6,000.

On the whole, the provisions for fighting fire on the mines are inadequate. Some mines have organized their own fire brigades, drills of the employees being held periodically, and they are supplied with fire engines, hose, chemical engines, etc. The mines of the Central Rand have the advantage of the Johannesburg fire brigade. But the mines of the outside districts stand a poor chance if a serious blaze breaks out in their reduction works. Besides buckets of water hung on the walls, and fire extinguishers, there are few appliances for fighting fire. These simple appliances are sufficient for a fire in its initial stage, but should a blaze get hold of a building most of these outside plants would be doomed.

An excellent example has been set by one mine. The use of timber is reduced to a minimum, structural steel and corrugated iron being substituted. Some buildings are free from wood, so that a fire is practically impossible. Timber of all kind is very expensive on the Rand. The substitution of structural steel in place of wood is not relatively as costly as in other parts of the world. By using steel the buildings can be made almost fire-proof. With such structures insurance could be greatly reduced, and in some instances done away with entirely.

A man would do a public service if he published an authoritative book, "What to Believe Concerning Madagascar." Not for a long time has a mining report caused such a sensation as Mr. Pope's recently published comments on the Lecomte Concession (Madagascar). It is highly optimistic and caused a feverish rise in the shares, which jumped from £9 to £16 the morning after the arrival of the report. Who can blame the man in the street from going "wild" when a report on a new goldfield ends thus: "In conclusion I have pleasure in stating that I think your property one of immense value, and when working on a large scale, as one of the premier gold producers of the age. Samples I am bringing with me to be assayed at Johannesburg."

General Mining News.

United States Mining Co.—At the annual meeting held in Portland, Me., Oct. 19, E. C. Swift and J. J. Storrow were added to the board of directors, succeeding C. A. Hight and Adolph Lewisohn. The other directors, Frederick Ayer, R. D. Evans, Sidney W. Winslow, E. N. Foss, N. W. Rice, W. H. Coolidge and A. F. Holden, were re-elected.

CALIFORNIA.

AMADOR COUNTY.

New London.—This mine, near Plymouth, sold for taxes, has been bought by W. F. Detert, of Jackson. The mine had been abandoned after some $200,000 had been expended for development work. Mr. Detert bought the claim for $566.

CALAVERAS COUNTY.

Mahala.—From this mine, near Rich gulch, Samuel Redmond and the Casey Bros. are taking some good rock. The ledge is 8 ft. wide.

EL DORADO COUNTY.

Sherman Mining Co.—This company at Placerville is running drifts with encouraging prospects. The ore so far on the dump is very highly sulphuretted.

HUMBOLDT COUNTY.

Herbert H.—The new ditch for this placer mine, near Willow creek, will bring the water from China creek district to the mine on Trinity river. The ditch will be ready for the water supply the coming season. The mine is owned by James Henderson, of China Flat, and Wm. Wagner and E. Beaulieu, of Arcata.

New Quartz Discoveries.—E. P. Campbell, Robt. Hutchins and Albert Lucas, of Eureka, have discovered a promising quartz ledge on the headwater of Summit creek, a tributary of Three creeks.

INYO COUNTY.

Augeberry. — The Peter Augeberry claims, near Ballarat, have been bonded to Goldfield, Nev., men. Assays of the ore run very high.

Panamint Range.—Several cañons have recently been contributing to the new strikes. Falls cañon has several promising prospects, among them the Pine Tree, Mizpah and Valley View. The Yo Tambien and Horn Spoon claims, owned by John Curran, have been bonded to Eastern men.

Oneonta District.—This district has now been called the Buena Vista, and is eight miles from Summit station, and is 45 miles from Bishop. There are 45 to 50 men in the camp. The Buena Vista is the most important of the claims so far discovered. There is plenty of water and timber at hand.

KERN COUNTY.

Tungsten.—C. S. Taylor has recently located a promising deposit of this ore near Johannesberg.

MONO COUNTY.

New Bodie.—The mill of this company at Bodie has commenced its first run on 600 tons of quartz from the mine. Wm. Loose is superintendent.

MONTEREY COUNTY.

Beach Sand Mines.—Ole Anderson and H. Godfriedsen are working beach sand mines near Moss Landing, and three other miners are working the beach opposite the Warnock place, near Castroville.

NEVADA COUNTY.

Buckeye.—For this mine at Willow Valley (Nevada City P. O.) a contract has been let for a 10-stamp mill.

Badger Hill.—At this drift mine, North Columbia, the hoisting plant has been completed and they are now sinking. This was formerly a hydraulic mine, but is now to be drifted.

Sultana Mining Co.—This company at Grass Valley has cleaned up $11,000 from a 28-day run with its 10-stamp mill, not including values in the slimes or sulphurets. About 100 men are at work on this property getting it in proper shape.

Junction.—This property, near North San Juan, has been bonded by the Huckins Bros. & Scrivens to R. W. Correll, of San Francisco, who is to organize a company to develop it.

Oustomah Mining Co.—This company at Nevada City has bought the 10-stamp mill of the Gold Tunnel mine.

Eclipse.—This mine, which formerly produced well, is being reopened by Simmons Bros. The old shaft will be cleaned out and re-timbered.

Buckeye.—This mine at Nevada City is about to erect, at the mouth of the incline shaft, a new 10-stamp mill. The drifts on the mine are being extended into new territory.

PLACER COUNTY.

Whiskey Diggings.—At this mine, nine miles northeast of Lincoln, new machinery has been installed and the several shafts will be sunk to greater depth. The ore carries both gold and copper.

SISKIYOU COUNTY.

Harris Bros.—The claims owned by these brothers on Salmon mountain, between Etna and Sawyers Bar, are being carefully prospected. The owners have a 2-stamp mill and concentrator on the properties.

Eliza.—The C. A. Patterson Co., which is putting up a mill on this mine, has secured the Judge Spence mine adjoining. The new mill will be of 12 stamps.

SIERRA COUNTY.

Sierra Madre Exploration Co.—This company, of which Geo. S. Montgomery, of San Francisco, is the head, is now crosscutting for an ore-shoot, which it is expected to reach at any time. The mine is on Cañon creek, above Sierra City.

SAN DIEGO COUNTY.

Cuyamaca Mining Co.—At the Stonewall mine of this company, at Cuyamaca, the unwatering and re-timbering have now been completed at a cost of some $70,000. The shaft, now 600 ft. deep, is being sunk to the 1,000-ft. level.

SHASTA COUNTY.

Reid.—At this mine, Old Diggings, a rich strike has been made. A 3-ft. shoot of ore has been opened up in the main workings.

TRINITY COUNTY.

Golden Standard.—At this mine, Coffee creek, owned by Cook & Conant, a new shoot of good ore has been struck. The ledge is 3 ft. wide.

Bully Choop.—At this mine, on the borders of Shasta county, and at one time a producer, considerable development work is being done by W. R. Beall, managing partner of those holding the option.

COLORADO.

GILPIN COUNTY.

Pleasant Valley Mining & Milling Co.—A 50-ton amalgamating and concentration plant is to be built on the Banta-Hill ranch property, in Pleasant Valley district; a new shaft-building and machinery have been put up on the Clive shaft and arrangements are being made for heavy operations. The company is extending the tracks of the Gilpin Tramway Co. for a distance of three miles for cheaper shipping facilities. R. L. Martin, Central City, is manager.

Gladstone.—A company has organized with capital stock of $50,000, with J. H. and W. H. Heinz, W. R. Hildebrand, J. C. Heinz and F. R. Van Meter as incorporators. The company will operate the Gladstone property in Illinois-Central district.

Jenny Creek Mining & Milling Co.—Good ores are being opened up on the property of this company on Jenny creek. The company intends to erect its own milling plant. B. F. Pyle, Tolland, Colo., is manager.

Ute.—A lease and contract for sale has been given to W. R. Pearce, of Nevadaville, who is associated with men of means, and operations have been resumed. The owners are H. J. Hawley and W. C. Fulleton, of Central City.

East Notaway.—A shipment from the Hopkins lease in the 555-ft. workings gave net returns of $228 per ton, the second class going $43.44 per ton, while 10 cords of milling ore brought returns of 2 oz. gold per cord on the plates, each cord making 1½ tons of tailings, which sold for $31.10 per ton.

CLEAR CREEK COUNTY.

New Era Mining Co.—Funds have been furnished for the carrying on of an active campaign of operations on the Bertha group, recently acquired by this company, and it is reported that machinery is to be installed. John O'Connell, Silver Plume, is manager.

Old Queen.—Idaho Springs people who have a lease and option have opened up a fine body of ore in driving a lateral in the Newhouse tunnel at a depth of 1,400

ft. The property is owned by H. J. Hawley, Central City.

Consolidated Park Co.—Idaho Springs business men have associated themselves together for the purpose of operating the Park group of claims up Virginia cañon, which will be developed by tunnel.

TELLER COUNTY—CRIPPLE CREEK.

Drainage Tunnel.—At a recent meeting of the Mine Owners' Association a report was made on the drainage tunnel by D. W. Brunton, the engineer in charge. No action was taken by the association further than listening to the report and ordering it printed.

El Paso Consolidated Gold Mining Co.—At a recent meeting of the directors of this company a dividend of 1c. per share was declared, instead of the usual one of 3c. per share. It is understood that the reason for the reduction, among other things, is that the value of ore is not as good as it was.

Caledonia.—This property, situated on the south spur of Gold hill, is to be sold at trustee's sale to satisfy a note given some years ago by Henry Seaton-Karr and Earnest Alfred Foster as trustees. The property is owned by English people, and at one time produced considerable ore. No work has been done on the property for some time.

Portland Gold Mining Co.—The directors of this company met recently and declared the usual quarterly dividend of 6c. per share and an extra one of 4c. per share, making in all 10c. per share. This makes $300,000 to be distributed among the stockholders. This is the third dividend this year of 10c. per share. One of 6c. was also paid, making altogether $1,080,000 distributed during the present year. Altogether the Portland has paid out over $6,000,000 in dividends.

INDIANA.

KNOX COUNTY.

The Bicknell coalfield is being developed to such an extent as to make it the greatest coal producing center in the State. In addition to the numerous mines opened, Zeller & McClellan, of Brazil, have secured options on 40,000 acres of coal land in this field and will put down several shafts at once.

POSEY COUNTY.

The filing of a number of leases during the past week by an Illinois coal-mining company headed by William Yannesman, covering all the available coal lands near Mt. Vernon, practically insures the immediate development of the Posey coalfield. Mr. Yannesman says his associates have ample capital, and that their investments will call for $100,000 or more. It has been known for some time that coal in paying quantities and of superior quality existed in Posey county. The prospect of developing this field has started a boom in Mt. Vernon and other towns.

DAVIESS COUNTY.

McNeeley Brothers have organized and incorporated a coal company with headquarters at Odon. The company has leased the mine formerly owned by the McCarter Brothers, near Odon. The shaft is 40 ft. deep and the product of excellent quality. The mine has only been in operation about a year.

GREENE COUNTY.

While prospecting in this county J. R. Bennett found a vein of lead ore. Reports spread that the hills on the east side of White river, south of Worthington, are full of ore. Options are being taken on all land that can be secured, and a company is being formed to develop a lead mine in this county.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Baltic.—Rock shipments to the mill at Redridge now average close to 2,000 tons daily. One stamp has been in commission part of the time recently on rock from the Champion mine. Sinking in the new No. 2 shaft is nearing the eighth level. It will be in commission to that point when production begins. The Baltic is making its copper for 7c. a pound now, expenses of every description included, and in the matter of its copper cost it ranks with the best properties on Lake Superior.

Calumet & Hecla.—Owing to the breaking of the drive-shaft of the hoisting engine which operates the cages in balance in the two west compartments of the Red Jacket shaft, that portion of the shaft is out of commission for a week. The idle compartments are used exclusively for handling men and supplies and there is no interruption to rock hoisting. While the engine is out of commission men and supplies are being handled largely through No. 4 shaft, an incline opening on the Calumet branch, which connects with the Red Jacket shaft at depth. An accident at No. 9 shaft, Hecla branch, caused a slight delay. The skip was drawn over the head sheave and through the roof of the shaft house.

Franklin.—After much delay and difficult work the Kearsarge amygdaloid lode has been encountered at the Junior branch of the mine. The lode was struck in No. 3 diamond drill hole, at a depth of 350 ft., and the core showed a formation 25 ft. wide, with copper. No. 3 hole is 1,500 ft. south of the Rhode Island boundary. It is expected No. 4 hole 1,500 ft. north of the Arcadian boundary, will strike the lode in a few days. The Franklin will make a survey to locate the probable outcrop of the lode, which will be opened by a shaft.

Isle Royale.—Exploratory work to locate the Baltic lode and test its coper values on this property will be started, a decision to this effect having been reached by the management. Preliminary operations will consist of cross trenching on surface. The Baltic lode was located by means of a diamond drill, which was operated more than a year ago. There are a number of points where the bed outcrops. These have been visited by Dr. L. L. Hubbard, former State geologist, who is assisting in locating the strike of the lode. It is estimated that 2,500 acres of Isle Royale lands carry the Baltic lode.

Michigan Gold Mine.—Capt. Edward Copps, manager of this old mine at Ishpeming, has secured a market for the remarkably pure quartz found in the mine, some of which runs from 96 to 97% silica. A stamp mill is to be erected, also a tube-mill for reducing the quartz to very fine powder, for shipment.

NEVADA.

NYE COUNTY.

Montana-Tonopah Co.—During the year a total of 8,028 tons of ore of the gross value of $70.01, or a total value of $362,054.29, was shipped to market by this company. The cost of transportation and treatment was $10.99 per ton, or $160,528.15. This leaves the net value of the ore shipped approximately $50.02 per ton, or $401,526.14, as shown in the financial statement. The manager reports there is sufficient ore in sight to pay $100,000 quarterly dividends for some years.

All of the Tonopah shipping mines, with the exception of the Tonopah Mining Co., have been instructed by the Utah smelters to reduce their shipments 30%. Shipments from Goldfield have been entirely stopped except on $100 ore or over.

The American Smelting Co. has a standing contract with the big Tonopah company to take a regular tonnage of ore daily, and in cutting down the shipping schedules of the Tonopah properties was thus obliged to exempt this company from the cut made. The mining situation at Tonopah today is in an anomalous position, when high-grade ore cannot be sent to the smelters because those plants are literally choked with ore.

ESMERALDA COUNTY.

There is considerable development work being done on what is called the Sodaville Copper Belt, but which is really the Shoshone mining district at the northern end of Pilot mountains, 18 miles east of Mina, the new town on the Carson & Colorado railroad. The copper belt on both sides of this range is about 12 miles long, in a contact of granite and lime. On the east side is the Dunlap mine, now being developed by the Guggenheim Exploration Syndicate; on the north end is the Copper Contact, a shipping mine, and on the south end is the D'Arcy mine, which is also producing shipping ore.

On the west side, at Garnet, are 10 claims owned by the Utavada Copper Co. The vein here, known as the north vein, is 13 ft. wide, and has been proved for 2,700 ft. on its course, being covered with an iron capping assaying well in gold,

while the copper ore assays from 5% up, with some gold, silver and lead values. A shipment of 40 tons, recently made, netted $40 a ton. The shaft on this property is now down 70 ft. and will be sunk 50 ft. before crosscutting. Parallel to this are the middle vein and the south vein. There are also some promising silver-lead properties in the vicinity, showing shipping ore on the surface. As the district is well supplied with water and $25 ore can be shipped at a profit, it is not surprising that it is attracting capital.

EUREKA COUNTY.

The next acquisition of the United States Mining Co. will, it is anticipated, be the Richmond-Eureka Copper properties at Eureka. These mines have recently been examined by Managing Director Holden and several experts, all of whom made very favorable reports concerning the conditions of the same. The cash expenditure that will be required in taking over the properties will, it is understood, be a small one.

NEW YORK.

ERIE COUNTY.

Work has been resumed at the Akron Gypsum Co.'s mines, at Akron, and it is expected that mills and the necessary buildings will soon be in course of construction.

OHIO.

HARRISON COUNTY.

Newton Coal & Mining Co.—This company has just been incorporated under the laws of Ohio, to develop the property formerly operated in a small way by the Monroe Coal Co., on the Pennsylvania railroad, near Urichsville. The incorporators of the new company are Chauncey G. Newton, Columbus, O.; H. D. Woodbridge, Newark, O.; Frank Culley, New Straitsville, O.; S. D. Fitton, Jr., Hamilton, O.; Howard Jones, Columbus, O.; Edw. H. Coxe, Hartshorne, Ind. Ter. Mr. Newton, until recently was general superintendent of the Columbus & Hocking Coal & Iron Co., will be the manager of the new company. This company has under lease 480 acres of land underlaid with the No. 7 vein of coal 4 ft. 2 in. thick, outcropping on the property.

OREGON.

BAKER COUNTY.

Many new strikes are being reported in different mines in the Elkhorn, Greenhorn, Granite and Bourne camps, to the west of Baker City; while to the east, in the Cornucopia district, there continues to be uncovered rich ore in the Union, Companion, May Flower and Queen of the Forest mines.

Black Bear.—The latest strike reported is in the Black Bear, a promising prospect, lying just north of the United Elkhorn mines, 16 miles west of Baker City. The property belongs to John Deerman and associates, who brought in some samples of the ore, yesterday, which is of the same character as the Elkhorn ore, and very rich. The owners report that they have uncovered a large ledge and are very much pleased with their find.

Rich Creek Placers.—O. C. Johnson has returned from the Rich Creek placers, on the lower edge of Baker county, near Malheur, and reports that this season's returns were good.

Monarch.—The company owning the Monarch mines, situated on Rock creek, about 16 miles west of Baker City, has redeemed the property from sheriff's sales by the payment of $650. The mine belongs to Seattle people, the president of the company being Roland Hughes. Superintendent Bagnell, it is understood, will resume operations in the near future.

Gold Bug.—Sensational reports are being brought in from the Gold Bug, a free gold property, situated in the Granite camp, 16 miles above Sumpter. The vein is reported to produce ore giving samples which assay up to $400 gold per ton. A mill will shortly be erected on the mine.

Sheridan-Empire.—This group, in the Granite district, is reported to be on good ore. The shoot is 4½ ft. wide.

Overland.—The crosscut tunnel on the Overland is expected to cut the vein within a few days; the tunnel is now in about 800 ft. Rich ore has been found in the upper levels of this mine.

Cracker-Highland.—Extensive development work will be undertaken at the Cracker-Highland shortly.

Among the producing mines of Baker county, the United Elkhorn is fast taking the lead. This property was formerly known as the Baisely-Elkhorn. It was acquired, a little more than a year ago, by F. P. Hayes, of Philadelphia. Under the management of Edward I. Field, it has shipped ore and concentrates to the Sumpter smelter, which returned sufficient to cover operating expenses. The main shaft is now down below the 400 level and crosscutting and drifting is in progress. Large orebodies have been blocked out, giving plenty of reserves, and the mill is in operation day and night to full capacity. Some 60 or 75 men are now employed.

PENNSYLVANIA.

BITUMINOUS COAL.

Pittsburg Coal Co.—At a meeting in Pittsburg, last week, the directors ratified the purchase of the Hero coke plant, comprising 30 acres of coking coal land adjoining the Pittsburg company's property, 30 coke ovens and a number of miners' houses. The directors also approved contracts for the building of 187 coke ovens, which are to be finished by Jan. 1; nearly 100 are at Colonial No. 2 plant and about 50 at Colonial No. 3. Plans were also approved for the construction of a $100,000 fueling dock at Aux Fresnes, on the Sault Ste. Marie river.

The Jones & Laughlin Co., one of the largest coal operators in Washington county, has taken an option over 16,000 acres of coal land in West Bethlehem and Amwell townships. The total price amounts to $4,000,000. Two years ago this concern mined 1,100,000 tons of coal in 12 months. During the present summer it has been shipping down the Monongahela river 70,000 tons a week. This would be at the rate of 3,500,000 tons a year. Taking into consideration that a portion of the year is dull, it is estimated the past 12 months will show that 2,000,000 tons of coal has been mined in this county by this company, or double the output of the year preceding.

As the coal vein in East Pike Run and West Pike Run townships is 7 ft. in thickness, it is safe to estimate that the Jones & Laughlin Co. is mining at the rate of 10 acres of coal per week or 500 acres per year. As the concern holds but 15,000 acres of coal land, its present mills, without figuring on any increase for the future, would consume this entire coal territory within 30 years. It is therefore evident the Jones & Laughlin Co. will take up the options on the 1,600 additional acres held by the Jones Brothers.

Clyde Coal Co.—Six miners were cut off and killed at this company's mine at Fredericktown, by a fire which started from an explosion in the fan-house. Two men were badly hurt by the explosion. Nearly 200 men were in the mine at the time, but all escaped except six.

SOUTH CAROLINA.

CHEROKEE COUNTY.

E. I. Evans, who has been prospecting for rare minerals in Cherokee county for several weeks, announces the discovery of platinum on the plantation owned by Captain W. P. Love, near Love spring. Pan assays, taken over an area of half a square mile, show payable mineral.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Wasp No. 2.—A five years' lease on the dump on Whitewood creek from the Wasp mill has been granted to F. G. Underwood, who will treat the tailings there by a method of his own. He has been making tests for the past four months.

Queen of the Hills.—Development work on this property in Whistler gulch, one mile from Deadwood, is progressing. In the main tunnel the work has gone through 345 ft. of solid ore, all of which has paying values. In the deepest shaft, 145 ft., this same orebody is again encountered. The company owns a good steam hoist and other necessary machinery.

CUSTER COUNTY.

Clara Bell.—Work on the new 10-stamp mill at this property is progressing nicely, and it is hoped that the mill will be in running order within two months. A

force of 27 men is at work. A drift is being run from the bottom of the 300-ft. shaft with the ore. The ledge is from 5 to 7 ft. wide. The ore is free-milling, and the company owns about 200 acres of ground.

TENNESSEE.

POLK COUNTY.

The United States Supreme Court has granted the State of Georgia permission to file a bill of complaint against the Tennessee Copper Co. and the Ducktown Sulphur, Copper & Iron Co., to prevent operation of their smelters in Tennessee, on the ground of injury to forests on the Georgia boundary line.

SMITH COUNTY.

A correspondent informs us that a promising fluorspar deposit has been discovered in a property situated near the Cumberland river and owned by the Tennessee Fluorspar Co. A shipment of 200 tons of fluorspar has recently been made over the Central Tennessee railroad. The company proposes to erect a grinding plant at the mine. The fluorspar, being of good grade, will be used in the glass and enameling industries.

TEXAS.

LIBERTY COUNTY.

Dayton.—Parafine Oil Co. No. 6 is flowing 1,500 bbl.. The well is only opened one turn and could make 6,000 bbl. if the crude could be handled. It is 725 ft. deep. Parafine No. 7 is also in and flowing 1,100 bbl.

Port Vernon Oil Co. No. 2 is bailing at 725 ft. and the well is expected in daily, it is situated on the western edge of the field and 1,2000 ft. from Parafine No. 6.

Other wells drilling are: Texas Co., down 1,000 ft.; Sun Co. No. 1, down 1,200 ft.; No. 2, down 1,800 ft. About 25 derricks are being erected and hundreds of people are on the way here. The large companies are endeavoring to lease land, but the holders prefer to sell; very little property has changed hands.

All the present flowing wells are between 690 and 725 ft. deep, but the Texas company and Sun company wells will test the deep sands and determine the gravity of the crude at that depth.

UTAH.

SALT LAKE COUNTY.

Columbus Consolidated.—The new three-story boarding house at this property will be ready for occupancy on Nov. 1. Shipments of both ore and concentrate are being forwarded to the smelters as rapidly as usual. Crude ore sent in this week netted about $50 to the ton.

South Columbus.—Development work at this property has been suspended for the winter.

Alta Superior.—This company is pushing development work actively. An effort is being made to induce the South Columbus management to name a price on that property, with a view of effecting a consolidation.

WEST VIRGINIA.

Coal & Coke Railroad.—This road, which is nearing completion, is being built by Henry G. Davis and Stephen B. Elkins, of this State. The railroad will extend from Charleston to Elkins, a distance of about 180 miles, and will traverse about 100,000 acres of undeveloped coal lands, said to be owned largely by Messrs. Davis & Elkins. At Charleston the road connects with the Chesapeake & Ohio, and the Kanawha & Michigan railroads; at Elkins with the West Virginia Central & Pittsburg; and at Belington with the Baltimore & Ohio railroad. It is expected that next year nearly 2,000,000 tons of coal and coke will be shipped over this new road to eastern and western points.

PHILIPPINE ISLANDS.

MASBATE.

Cogran Mining & Development Association.—This company, whose property is at Camp Luia, on the island of Masbate, has been pushing development work with all possible speed, with a view to putting in reduction machinery before the first of the year. The main tunnel is in 200 ft. and a crosscut has been driven at its face, which shows a body of ore 24 ft. wide, averaging $9 per ton. A crosscut tunnel 150 ft. farther up the mountain has also been driven, in which is disclosed 20 ft. of good ore. By this work between 30,000 and 40,000 tons of good milling ore has been blocked out on three sides, that can be taken out by an open cut at an expense not exceeding 25c. per ton.

A shaft is also being sunk with the expectation of encountering the vein at a depth of 100 ft. below the floor of the main tunnel. If this is accomplished, a drainage tunnel will be driven to the bottom of the shaft and the 700-ft. level opened. An arrastra is running on the property, being used for testing the different ores, all of which are free milling.

A shipment of two tons has also been made to the United States for testing. Mr. George Jancke is superintendent.

Dredging.—A Risdon steam dredge is in successful operation near Camp Luia.

Foreign Mining News.

AFRICA.

NATAL.

The Natal Graphite Mines, Ltd., was formed in London recently to work a deposit of graphite found in the Impetyini forest, 20 miles southwest of Harding, close to the East Griqualand border. It is proposed to export the graphite in a practically marketable form, ready for production as lead pencils, retorts, crucibles, etc., in the home markets.

TRANSVAAL.

The Chamber of Mines reports the output of gold in September at 416,487 oz. fine, a decrease of 12,094 oz. from August. For the nine months ending Sept. 30 the total was 3,607,621 oz., which compares with 2,749,267 oz. in 1904; showing an increase of 858,354 oz., or 31.2% this year.

The labor account shows that on Sept. 30 there were 85,634 Kaffirs and 44,491 Chinese employed in the mines. This is a net loss of 3,195 negroes and 74 Chinamen during the month.

ASIA.

INDIA—MYSORE.

Kolar Goldfield.—The gold output in September was 52,033 oz. bullion. For the nine months ending Sept. 30 it was 469,302 oz. bullion, an increase of 1,206 oz. only over last year. The output this year was equal to 422,372 oz. fine gold, or $8,730,429 in value.

AUSTRALIA.

NEW SOUTH WALES.

The New South Wales gold yield for September amounted to 30,266 oz., valued at £113,731, as compared with 21,289 oz., valued at £81,285, during September, 1904. For the past nine months of the present year the yield amounted to 229,879 oz., valued at £804,043, as compared with 231,776 oz., valued at £840,117, during the corresponding period of last year.

WESTERN AUSTRALIA.

The Mines Department reports the gold output for September at 163,297 oz. The reports are now made in fine gold. For the nine months ending Sept. 30 the total production reported was 1,469,353 oz. fine gold.

CANADA.

NOVA SCOTIA—CAPE BRETON.

Dominion Coal Co.—The output in tons, of the Dominion Coal Co. for September, and the nine months of the current year, is as follows:

	1904.	1905.
September	275,734	322 288
Nine months	2,334,779	2,341,934

There was little change, the increase for the nine months being only 7,155 tons.

QUEBEC.

Some gold has for years been obtained from placer workings on the St. Maurice river, but the quantity has been small. Recent discoveries are reported at Grandes Piles, on the river, and exploration is going on. A discovery is also reported on Kennedy creek, a tributary of the St. Maurice, 30 miles above La Tuque. Work is to be pushed there in the spring.

YUKON TERRITORY.

Bonanza Basin Gold & Dredging Co.—This company is preparing to dredge in

the Klondike river, below Bonanza creek. Explorations by drill are said to have shown paying quantities of gold in the gravel of the river bed.

EUROPE.

SPAIN.

Rio Tinto Co., Ltd.—The following circular from the directors is dated London, Oct. 11, covering the operations for the first half of the current fiscal year: "The deliveries of pyrites in the United Kingdom and the Continent of Europe have so far this year rather exceeded those of last year; the United States consumption is also slightly higher than that of 1904. The copper contents of pyrites shipped to all markets has also been somewhat higher. The consumption of non-cupreous sulphur ore is very largely in excess of the previous year. The quantity of refined copper produced and sold from Cwmavon will be less than in 1904. The ore mined during the first half of the year was of decidedly better quality than that obtained from the mine in 1904, and this year's output of copper at the mines would have been larger than that for 1904 but for the continuance of the serious drought, referred to in the April report, which prevented the company from using sufficient water for washing the ore heaps. During the remainder of the year, after the autumnal rains commence, it is hoped that some of the shortage from this source may be made up. As, however, this additional copper mined has been put on to the heaps, its recovery in marketable form is only somewhat postponed.

"The position of the copper market has been exceedingly satisfactory during the whole of this year and much better prices have been obtained than in 1904, and all indications point to a continuance of good prices, which are so beneficial to the company's operations. The consumption from all quarters seems to be increasing at a more rapid rate than the output of the various mines. Your directors have now the pleasure to declare, out of the estimated profits of the year, a dividend for the six months ended June 30 last of 2s. 6d. per share, less income tax, on the 5% preference shares, and an interim dividend of 40s. per share, free of income tax, on the ordinary shares, both payable on Nov. 1 next.

"The company has now for the first time the legal right to pay off its outstanding mortgage bonds, which amount to £2,989,740. The directors feel that this operation would be highly desirable from every point of view, and with this object notice is given of a special general meeting to be held Oct. 19, at which the directors will propose to increase the capital by the creation of an additional 50,000 ordinary shares of £5 each, to rank *pari passu* with the existing ordinary shares, to the holders of which the new shares will in the first instance be offered."

Coal Trade Review.

NEW YORK, Oct. 25.

ANTHRACITE.

The hard-coal market shows a widespread improvement. The East is hurrying to lay in stocks before ice closes its tidewater points, and the West to supply itself before traffic is impeded by bad weather. Shortage of cars is affecting deliveries in both directions, and if the present conditions continue, as they must almost inevitably, an advance in price of hard coal for immediate delivery, over the circular rates, may be confidently anticipated. Demand for the steam sizes continues strong.

Prices remain at the old level: $4.75 for broken and $5 for domestic sizes. Steam sizes: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice and $1.30@$1.35 for barley, f. o. b. New York harbor shipping points.

BITUMINOUS.

The Atlantic seaboard soft-coal trade is strong, demand heavily exceeding the supply. Shortage of cars contributes to this condition, as well as the near approach of the time when many tidewater ports will be ice-bound. Many large producers are trying to escape orders for immediate delivery, and their present output is quickly absorbed by the consumers.

Trade in the far East is making strong demands for coal, especially at those of the ports which are earliest ice-bound. Freight limitations seem to be practically removed, a condition made necessary by the lack of light draft vessels. The entire demand from this territory cannot be supplied and producers are confining themselves to shipments to the most needy. The Sound is calling for more than can be provided. They are trying to fulfil their monthly proportion of this business, but are believed to be falling behind slightly. Vessels to this territory are scarce and in demand.

New York harbor quickly absorbs all the coal that arrives, but producers are giving more attention to contracts than to current business. Spot coal of good grade sells for $2.60@$2.70 f. o. b. New York harbor shipping points, while a little better grade brings $2.90@$2.95. All-rail trade is ordering increased shipments, but producers ship only their regular proportion this way, trying to get as much as possible to tide.

Car supply is poor in all territories, though some are worse off than others. Supply at some places is said to be less than one-half the requirements. Transportation is excellent, and this helps out matters in many ways.

Vessels in the coastwise market are in a little better supply, though light ones are scarce. Current rates on the larger boats from Philadelphia are: To Boston, Salem and Portland, 80c.; to Lynn, Newburyport, Gardner and Bangor, $1; to the Sound, 70@75c.; to Portsmouth and Bath, 85c.; New York harbor vessels charge 55@60c. to around the capes.

COAL TRAFFIC NOTES.

The coal and coke originating on all lines of the Pennsylvania railroad east of Pittsburg and Erie were as follows for the year to Oct. 14, in short tons:

	1904.	1905.	Changes.
Anthracite	3,503,926	3,566,086	I. 62,160
Bituminous	21,149,165	22,982,411	I. 1,833,246
Coke	6,655,638	8,609,807	I. 1,954,169
Total	31,308,729	35,158,304	I. 3,849,575

The increase in coke this year was 29.3%, while the total increase was 12.3%, a large gain.

The Ohio Coal Traffic Association reports coal shipments on Ohio railroads as follows, for the eight months ending Aug. 31, in short tons:

Railroads.	1904.	1905.
Hocking Valley	2,413,969	2,205,948
Toledo & Ohio Central	1,233,017	951,925
Baltimore & Ohio	1,025,253	1,313,138
Wheeling & Lake Erie	1,493,858	1 675,841
Cleveland, Lorain & Wheeling	1,000,419	1,327.022
Zanesville & Western	559,405	553,092
Toledo Division Penn. Co.	1,198,199	1,161,333
Lake E., Alliance & Wheeling	117,668	473,364
Total	9,041,848	9,661,663

The total increase was 619,815 tons, or 6.9%, this year.

Birmingham. Oct. 23.

The railroad-car shortage in Alabama is being felt considerably, and the mine operators are urging the railroads to give some relief. It is learned that a number of the union coal miners who have been out on strike for the past 14 months are returning to the mines, getting such work as they can. This is being accomplished by leasing some of the mines to outside parties, work being then given to whatever men apply for same. In one instance, union men are being given the work as fast as they apply and the union wages are being paid, but no contract is signed and the men do not get two pay-days a month, as demanded in the union contract.

The coke situation is somewhat better than it has been lately. A number of new ovens are being blown in. The Alabama Consolidated Coal & Iron Co. is making preparations to save by-products at the Lewisburg ovens, especially the gas, which will be used for fuel at the boilers for the mines. This is the only furnace company in the State able to place coke on the open market. This company is erecting a new furnace at Gadsden, and toward the middle of the coming year will need considerable coke for its own use.

Cleveland. Oct. 24.

The coal market is on the rise. In this territory there is a better demand for run-of-mine steam coal, which has advanced to $1.05 at mines for Ohio, with still higher prices predicted. There is also a better demand for slack, on which the price ranges about 60c. to 70c. at Ohio mines. The rise in prices is due partly to the

increased demand, and partly to the fact that cars are extremely short and shipments are delayed.

Shippers of coal by lake are now busily engaged in sending material forward on their contracts, and are not looking for new orders. The price has been marked up, but deliveries are not assured. The market is now represented by a quotation of $2.05 f. o. b. boats at Lake Erie ports.

It is now announced that domestic coal prices in Cleveland are to be advanced Nov. 1 to equalize the rates here with what they have been in outside territory. The advance will be 25c. a ton, making the selected Massillon lump $2.35 at mines, with other prices shaded on that quotation.

Coke prices are again stronger and higher. The best grades of 72-hour coke are now selling at $3.75 at the oven, with the best grades of furnace coke selling at $3.25 to $3.50. Owing to the car shortage deliveries are uncertain and unsatisfactory. The entire fuel market is stronger than it has been for nine months.

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Foreign Coal Trade.

Oct. 25.

During the fiscal year ending June 30, 1905, the imports of fuel into Canada, and the value thereof, were as follows:

	Tons.	Value.
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Coke	371,593	807,842
Charcoal	.....	46,862
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Exports of fuel from Great Britain for the nine months ending September 30, were as follows, in long tons:

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Coke	525,731	522,496	D. 3,235
Briquett	957,744	848,603	D. 109,141
Total	36,050,180	36,679,755	I. 629,675

In addition to these exports, the coal sent abroad for the use of steamships engaged in foreign trade was 13,071,367 tons in 1905, as compared with 12,837,333 for the first nine months of 1904; an increase of 234,034 tons. The total fuel sent abroad and consumed outside the United Kingdom in the nine months of this year amounted to 49,751,122 tons.

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Pacific ports	74,272	75,160	I. 888
Total	100,346	112,491	I 12,145

The changes were not noteworthy. The more important exports were: Germany, 5,750,045; Spain and Canaries, 1,750,677; France, 4,797,674; Italy, 4,985,696; and Egypt, 1,724,689 tons.

Iron Trade Review.

New York, Oct. 25.

The iron and steel markets continue decidedly strong. Demand for material of all kinds is unchanged, and in some lines there is almost a rush to secure supplies. Pig-iron prices show a decided advance, and further increases are talked of, especially in view of the higher prices for coke which have been established, making a material increase in the cost of iron.

Ore supplies for this year, however, are now secured, even if the weather should compel an early closing of lake navigation. The Lake Superior ranges have responded fully to the demand upon their resources. Shipments have been very large, so that the ore-docks and furnace yards are generally full.

Finished material continues in heavy demand. The railroad orders for new equipment and for rails have been very heavy; and a large proportion of the rolling stock orders is for steel cars. This has increased the current demand for steel plates and shapes, which was already large.

The shortage of cars and motive power on the railroads is a serious factor just now. Complaints are heard everywhere of delays in delivering coke, ore and other transportation of finished material from the mills. There seems little prospect of present improvement.

Birmingham. Oct. 23.

Pig-iron prices in Alabama are looking upward, with very little iron to be had for delivery between now and next March. No. 2 foundry is now being held in this section for $13.50 and $14, and it is stated that some sales have been made at the last-named figure, delivery stipulated for this year. Production in this district is being held up pretty well. The Tennessee Coal, Iron & Railroad Co. will hardly be able to blow in Alice furnace, in this city, until December, if by then. A little furnace at Rock Run, Ala., capacity less than 90 tons a day, has been started up and will soon be placing its regular production on the market.

It is denied that there has been much iron sold in this district for speculative purposes. The Sloss-Sheffield Steel & Iron Co. disposed of more than 250,000 tons of iron in the past few weeks, delivery during the first half of the coming year. The other companies in this district, with the exception of one or two which allow iron brokers and dealers to handle their product, announce that their iron has been sold to consumers and not to speculators.

The local consumption is quite heavy. In addition to three mills using pig iron, one rolling mill is using steel, three cast-iron pipe works are in full blast, three soil-pipe works, several foundries and machine shops and other works are requiring a large quantity of pig iron.

The following quotations are given: No. 1 foundry, $14; No. 2 foundry, $13.50 @$14; No. 3 foundry, $12.50@$13; No. 4 foundry, $12@$12.50; gray forge, $11.50; No. 1, soft, $14; No. 2, soft, $13.50@$14.

The change in directors and in the presidency of the Republic Iron & Steel Co. is being commented on in the Birmingham district. There is no fear that the Alabama plants of this company will suffer in the change of management; on the contrary, rumors have prevailed here of late that the United States Steel Corporation is now interested in the Republic company and that further development is probable in the Birmingham district.

Cleveland. Oct. 24.

Iron Ore.—Storms on the lakes retarded the shipment of ore during the week, but without causing any uneasiness among shippers or consumers, since the supply is already abundant for winter needs. Wild boats are now scarce, because rates are so high for grain. Shippers have not advanced rates, depending entirely upon the wild tonnage.

Pig Iron.—The scramble to get iron is now the feature of the market. Consumption is running ahead of production in all lines, especially in the steel-making irons. Furnaces have withdrawn from the market, having sold up, or being unwilling to quote for future delivery on account of the uncertainty of coke prices. Cars are short, increasing the scarcity of material. These situations have boosted the price of iron. The minimum on No. 2 foundry is now $16 in the Valleys, with $16.50 the ruling quotation.

Finished Material.—The situations prevailing in the market in the recent past have been intensified during the past week. Bar iron is now in short supply, and there is a scramble to get material. Many of the mills are sold up for the major part of the first half of next year. The price has been marked up to 1.75c., Youngstown. Sheets are a little stronger, although they constitute the weak spot of the market. Plates are in better demand, due to the fact that shipbuilders have big repair jobs as a result of last week's storm. Some of the smaller mills in the East are charging premiums, their supply running short. Billets are scarce and at a premium, the market holding firm at $27@$28 Pittsburg for bessemer and $30 to $31 Pittsburg for the forging quality. Structural brings a premium of $5 to $7 readily over the present association price.

New York. Oct. 25.

Pig Iron.—Business continues active, and sales have been large. Most furnaces are well sold up into 1906. Several of the large Southern producers are out of the market at present. There is much complaint of delays on the railroads, and deliveries are uncertain.

Prices are again higher. For Northern iron in large lots, we quote: No. 1X, $17.75@$18.25; No. 2X, $17.50@$17.75; No. 2 plain, $17@$17.25; forge, $15.75@$16.75. Basic is still in demand; $17.50@$17.75 is asked for Alabama, and 25c. less for Northern. Virginia foundry is held around $18 for No. 1 and $17.50 for No. 2. For Southern iron, on dock, quotations are: No. 1 foundry, $17.75@$18; No. 2, $17.25@$17.50; No. 3, $16.50@$17; No. 4, $16@$16.50; No. 1 soft, $17.75@$18; No. 2 soft, $17.25@$17.50; gray forge, $15.75@$16; No. 2 foundry and No. 2 soft are rather scarce.

Cast-Iron Pipe.—Business continues good. Quotations are: $27.50 per net ton, carload lots at tidewater, for 6-in. pipe.

Bars.—Business is good. Iron bars are 1.745c., tidewater, for plain, and 1.795c. for refined. Steel bars are 1.745c., tidewater. Store trade is good, with 2.25c. the current price. There is still talk of higher prices.

Plates.—Steel plates are in demand. Tank plates are 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745c. up, according to width. For early delivery premiums are asked.

Structural Material.—Small orders continue to come in freely, and the mills will not guarantee deliveries. Prices are unchanged. Beams under 15-in. are 1.845c. for large lots; over 15-in., 1.895c.; angles and channels, 1.845c., tidewater delivery.

Steel Rails.—No change in standard sections. Light rails are in demand and higher, prices ranging from $23.50 for 35-lb., up to $29 for 12-lb. rails.

Old Material.—Demand is strong, and prices are higher. No. 1 railroad wrought is $22@23; No. 1 yard wrought, $20@$21; machinery cast, $14.50@$15; heavy steel melting scrap, $17@$18. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. Oct. 25.

Pig Iron.—With an upward tendency in prices there is a more conservative movement among buyers, excepting in basic, which is due to the fact that the more urgent requirements of most of the consumers in eastern Pennsylvania have been practically covered. Still it is known that there would be a great deal of business placed immediately were the furnace people willing to yield a point on prices and to make fixed dates for delivery. They balk on both these points. Quotations may be fairly given at $18.25 for No. 1X foundry; $17.50 for No. 2X; $17 for No. 2 plain; $18 for No. 2X Southern; $16 for forge, $17.50 for basic, and $22 to $22.50 for low phosphorus.

Billets.—Quotations are nominal and may be given at $29. Buyers for the present are awaiting developments.

Bars.—The bar situation is very strong, a large amount of business having been placed recently, especially for common iron, which is urgently wanted both for near and remote deliveries. Best refined iron is quoted at 2c., with all the business offering that can be taken care of.

Sheets.—The larger consumers who have taken care of the requirements for the rest of the year are now negotiating for large supplies for the coming year.

Skelp Iron.—Skelp iron has been sold very freely within a few days and prices moved up.

Pipes and Tubes.—Boiler tubes are wanted in large quantities. The mills are so oversold that the best they can do is to keep their customers in good humor.

Plates.—The demand for plates is simply tremendous. Every concern using plate-bars has more business than can be taken care of for the next 60 days. Car and locomotive shops are choked up with work and the horizon is black with orders.

Structural Material.—The rule rather than the exception now is to pay premium prices, not only for early, but also long-deferred deliveries.

Steel Rails.—Heavy orders continue to be taken by the rail mills, but nearly everything is for next year's delivery.

Scrap.—Some of our scrap dealers are claiming that they have sold and agreed to deliver certain kinds of scrap at an advance of 50c. over the first of the month. The most urgent demand is for No. 1 wrought railroad; low phosphorus scrap, machinery scrap and No. 1 steel scrap. Quotations of steel scrap may be given fairly at $17@$17.50; low phosphorus at $22.50; No. 1 yard scrap at $19.25, and machinery scrap at $16 to $16.50 per ton.

Pittsburg. Oct. 24.

Prices of bessemer, basic and foundry No. 2 pig iron are practically uniform. While most of the furnaces are well sold up for this quarter, there are still some small lots that might be obtained at the low figure for prompt delivery, but it is not possible to buy November bessemer iron at less than $16, Valley, and indications now point to a further advance due, principally, to the increased cost of coke. The United States Steel Corporation rather unexpectedly entered the market last week and bought 40,000 tons of bessemer iron, half for delivery this month and the rest for November. The price for the prompt iron was $15.50, Valley furnaces, and for next month's delivery 50c. was added to the price. This firmly established $16, Valley, as the minimum price for November iron. The sale to the Steel Corporation appears to be regarded as an important transaction, although it is only two days' supply, the plants of the corporation consuming fully 600,000 tons of pig iron a month. For some reason an effort was made to keep the sale a secret, but without success. The contract was equally divided between the Bessemer Pig Iron Association and W. P. Snyder & Co. The Carnegie Steel Co. is operating all of its blast-furnaces except one of the Duquesne group, which is being repaired, but will be ready to operate in a short time. This company has discontinued the production of ferro-manganese for the present and put the furnace on standard bessemer iron. It has been a heavy buyer of ferro during the month, and there has been a further increase in price. The car shortage is becoming more serious each week, and some of the blast-furnaces are short of coke. Many inquiries for coke were re-

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Iron Trade Review.

New York, Oct. 25.

The iron and steel markets continue decidedly strong. Demand for material of all kinds is unchanged, and in some lines there is almost a rush to secure supplies. Pig-iron prices show a decided advance, and further increases are talked of, especially in view of the higher prices for coke which have been established, making a material increase in the cost of iron.

Ore supplies for this year, however, are now secured, even if the weather should compel an early closing of lake navigation. The Lake Superior ranges have responded fully to the demand upon their resources. Shipments have been very large, so that the ore-docks and furnace yards are generally full.

Finished material continues in heavy demand. The railroad orders for new equipment and for rails have been very heavy; and a large proportion of the rolling stock orders is for steel cars. This has increased the current demand for steel plates and shapes, which was already large.

The shortage of cars and motive power on the railroads is a serious factor just now. Complaints are heard everywhere of delays in delivering coke, ore and other transportation of finished material from the mills. There seems little prospect of present improvement.

Birmingham. Oct. 23.

Pig-iron prices in Alabama are looking upward, with very little iron to be had for delivery between now and next March. No. 2 foundry is now being held in this section for $13.50 and $14, and it is stated that some sales have been made at the last-named figure, delivery stipulated for this year. Production in this district is being held up pretty well. The Tennessee Coal, Iron & Railroad Co. will hardly be able to blow in Alice furnace, in this city, until December, if by then. A little furnace at Rock Run, Ala., capacity less than 90 tons a day, has been started up and will soon be placing its regular production on the market.

It is denied that there has been much iron sold in this district for speculative purposes. The Sloss-Sheffield Steel & Iron Co. disposed of more than 250,000 tons of iron in the past few weeks, delivery during the first half of the coming year. The other companies in this district, with the exception of one or two which allow iron brokers and dealers to handle their product, announce that their iron has been sold to consumers and not to speculators.

The local consumption is quite heavy. In addition to three mills using pig iron, one rolling mill is using steel, three cast-iron pipe works are in full blast, three soil-pipe works, several foundries and machine shops and other works are requiring a large quantity of pig iron.

The following quotations are given: No. 1 foundry, $14; No. 2 foundry, $13.50 @$14; No. 3 foundry, $12.50@$13; No. 4 foundry, $12@$12.50; gray forge, $11.50; No. 1, soft, $14; No. 2, soft, $13.50@$14.

The change in directors and in the presidency of the Republic Iron & Steel Co. is being commented on in the Birmingham district. There is no fear that the Alabama plants of this company will suffer in the change of management; on the contrary, rumors have prevailed here of late that the United States Steel Corporation is now interested in the Republic company and that further development is probable in the Birmingham district.

Cleveland. Oct. 24.

Iron Ore.—Storms on the lakes retarded the shipment of ore during the week, but without causing any uneasiness among shippers or consumers, since the supply is already abundant for winter needs. Wild boats are now scarce, because rates are so high for grain. Shippers have not advanced rates, depending entirely upon the wild tonnage.

Pig Iron.—The scramble to get iron is now the feature of the market. Consumption is running ahead of production in all lines, especially in the steel-making irons. Furnaces have withdrawn from the market, having sold up, or being unwilling to quote for future delivery on account of the uncertainty of coke prices. Cars are short, increasing the scarcity of material. These situations have boosted the price of iron. The minimum on No. 2 foundry is now $16 in the Valleys, with $16.50 the ruling quotation.

Finished Material.—The situations prevailing in the market in the recent past have been intensified during the past week. Bar iron is now in short supply, and there is a scramble to get material. Many of the mills are sold up for the major part of the first half of next year. The price has been marked up to 1.75c., Youngstown. Sheets are a little stronger, although they constitute the weak spot of the market. Plates are in better demand, due to the fact that shipbuilders have big repair jobs as a result of last week's storm. Some of the smaller mills in the East are charging premiums, their supply running short. Billets are scarce and at a premium, the market holding firm at $27@$28 Pittsburg for bessemer and $30 to $31 Pittsburg for the forging quality. Structural brings a premium of $5 to $7 readily over the present association price.

New York. Oct. 25.

Pig Iron.—Business continues active, and sales have been large. Most furnaces are well sold up into 1906. Several of the large Southern producers are out of the market at present. There is much complaint of delays on the railroads, and deliveries are uncertain.

Prices are again higher. For Northern iron in large lots, we quote: No. 1X, $17.75@$18.25; No. 2X, $17.50@$17.75; No. 2 plain, $17@$17.25; forge, $15.75@$16.75. Basic is still in demand; $17.50@$17.75 is asked for Alabama, and 25c. less for Northern. Virginia foundry is held around $18 for No. 1 and $17.50 for No. 2. For Southern iron, on dock, quotations are: No. 1 foundry, $17.75@$18; No. 2, $17.25@$17.50; No. 3, $16.50@$17; No. 4, $16@$16.50; No. 1 soft, $17.75@$18; No. 2 soft, $17.25@$17.50; gray forge, $15.75@$16; No. 2 foundry and No. 2 soft are rather scarce.

Cast-Iron Pipe.—Business continues good. Quotations are: $27.50 per net ton, carload lots at tidewater, for 6-in. pipe.

Bars.—Business is good. Iron bars are 1.745c., tidewater, for plain, and 1.795c. for refined. Steel bars are 1.745c., tidewater. Store trade is good, with 2.25c. the current price. There is still talk of higher prices.

Plates.—Steel plates are in demand. Tank plates are 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745c. up, according to width. For early delivery premiums are asked.

Structural Material.—Small orders continue to come in freely, and the mills will not guarantee deliveries. Prices are unchanged. Beams under 15-in. are 1.845c. for large lots; over 15-in., 1.895c.; angles and channels, 1.845c., tidewater delivery.

Steel Rails.—No change in standard sections. Light rails are in demand and higher, prices ranging from $23.50 for 35-lb., up to $29 for 12-lb. rails.

Old Material.—Demand is strong, and prices are higher. No. 1 railroad wrought is $22@23; No. 1 yard wrought, $20@$21; machinery cast, $14.50@$15; heavy steel melting scrap, $17@$18. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. Oct. 25.

Pig Iron.—With an upward tendency in prices there is a more conservative movement among buyers, excepting in basic, which is due to the fact that the more urgent requirements of most of the consumers in eastern Pennsylvania have been practically covered. Still it is known that there would be a great deal of business placed immediately were the furnace people willing to yield a point on prices and to make fixed dates for delivery. They balk on both these points. Quotations may be fairly given at $18.25 for No. 1X foundry; $17.50 for No. 2X; $17 for No. 2 plain; $18 for No. 2X Southern; $16 for forge, $17.50 for basic, and $22 to $22.50 for low phosphorus.

Billets.—Quotations are nominal and may be given at $29. Buyers for the present are awaiting developments.

Bars.—The bar situation is very strong, a large amount of business having been placed recently, especially for common iron, which is urgently wanted both for near and remote deliveries. Best refined iron is quoted at 2c., with all the business offering that can be taken care of.

Sheets.—The larger consumers who have taken care of the requirements for the rest of the year are now negotiating for large supplies for the coming year.

Skelp Iron.—Skelp iron has been sold very freely within a few days and prices moved up.

Pipes and Tubes.—Boiler tubes are wanted in large quantities. The mills are so oversold that the best they can do is to keep their customers in good humor.

Plates.—The demand for plates is simply tremendous. Every concern using plate-bars has more business than can be taken care of for the next 60 days. Car and locomotive shops are choked up with work and the horizon is black with orders.

Structural Material.—The rule rather than the exception now is to pay premium prices, not only for early, but also long-deferred deliveries.

Steel Rails.—Heavy orders continue to be taken by the rail mills, but nearly everything is for next year's delivery.

Scrap.—Some of our scrap dealers are claiming that they have sold and agreed to deliver certain kinds of scrap at an advance of 50c. over the first of the month. The most urgent demand is for No. 1 wrought railroad; low phosphorus scrap, machinery scrap and No. 1 steel scrap. Quotations of steel scrap may be given fairly at $17@$17.50; low phosphorus at $22.50; No. 1 yard scrap at $19.25, and machinery scrap at $16 to $16.50 per ton.

Pittsburg. Oct. 24.

Prices of bessemer, basic and foundry No. 2 pig iron are practically uniform. While most of the furnaces are well sold up for this quarter, there are still some small lots that might be obtained at the low figure for prompt delivery, but it is not possible to buy November bessemer iron at less than $16, Valley, and indications now point to a further advance due, principally, to the increased cost of coke. The United States Steel Corporation rather unexpectedly entered the market last week and bought 40,000 tons of bessemer iron, half for delivery this month and the rest for November. The price for the prompt iron was $15.50, Valley furnaces, and for next month's delivery 50c. was added to the price. This firmly established $16, Valley, as the minimum price for November iron. The sale to the Steel Corporation appears to be regarded as an important transaction, although it is only two days' supply, the plants of the corporation consuming fully 600,000 tons of pig iron a month. For some reason an effort was made to keep the sale a secret, but without success. The contract was equally divided between the Bessemer Pig Iron Association and W. P. Snyder & Co. The Carnegie Steel Co. is operating all of its blast-furnaces except one of the Duquesne group, which is being repaired, but will be ready to operate in a short time. This company has discontinued the production of ferro-manganese for the present and put the furnace on standard bessemer iron. It has been a heavy buyer of ferro during the month, and there has been a further increase in price. The car shortage is becoming more serious each week, and some of the blast-furnaces are short of coke. Many inquiries for coke were re-

ceived this week, and negotiations are pending for large tonnages for next year. One interest offered $2.80 a ton for 30,000 tons of furnace coke for delivery extending through the first half, but the offer was promptly rejected, as the minimum price is $3 a ton. Unless more railroad cars are put in the coke trade prices will go still higher, and pig-iron prices will be correspondingly increased.

Contrary to expectations, the steel-plate pool did not advance prices, and no change was made in merchant-steel bars. The steel-billet pool is scheduled to meet this week, but according to the statement of one of the members, nothing will be done looking to a change in the established price of $21 for billets. Some of the plate manufacturers wanted to advance the price, but opposition came from Eastern makers, who are not so well sold up as in the West. It was argued that no advance is necessary, as a manufacturer has the privilege of fixing his own price, regardless of any action by the pool. A representative of a large steel interest declared today that present pool prices will not be disturbed, but that premiums will be quoted in the future. It is contended that official advances in prices might deter buying. The Pennsylvania Railroad Co. has placed orders for 20,000 steel cars, 10,000 gondola, 5,000 hopper coal cars and 5,000 box cars. Since July 1 the company has contracted for 37,321 cars. The first delivery on the last order is to be made in May, and all are to be delivered by December, 1906. The United States Steel Corporation has ordered 1,250 steel cars for the orefields. The Baltimore & Ohio Railroad Co. has placed contracts for 71,000 tons of steel rails, which is its initial order for 1906. Other orders likely will be placed later, and the Pennsylvania also is expected to add a large tonnage to the contracts already made. There has been an improvement in the sheet and tin-plate trade, and more mills have been put in operation. The American Sheet & Tin Plate Co. started the week with 85% of its sheet and 65% of its tin-plate mills running. It is expected that all of its plants will be operating to capacity before the middle of next month. Most of the independent mills are operating, but not in full, owing to inability to get steel. It is reported here that the change in the management of the Republic Iron & Steel Co. may result in the carrying out of plans of John W. Gates for the erection of a large wire plant. These plans, it is said, were opposed by President A. W. Thompson, who was not re-elected at the annual meeting last week, and who will be succeeded by S. G. Cooper, of Banning, Cooper & Company.

Pig Iron.—Outside of the purchase of 40,000 tons of bessemer iron by the United States Steel Corporation, there were no important transactions during the past week. Sales of all grades were confined to small lots, and prices of bessemer, basic and foundry No. 2 range from $15.75 to $16, Valley furnaces. Gray forge is firm at $15.85, Pittsburg.

Steel.—There is very little steel to be had. Bessemer billets are quoted at $26, and open-hearth billets are higher. Sheet and tin-plate bars are quoted at $27. Plates remain at 1.60c., and merchant steel bars at 1.50c., but premiums are paid for prompt delivery.

Sheets.—There is an improved demand for sheets, but prices remain about the same. Blank sheets are quoted at 2.30c., and galvanized at 3.30c. for No. 28 gauge.

Ferro-Manganese.—There is no domestic ferro in the market, and the foreign product is quoted at $62 a ton.

Cartagena, Spain. Sept. 30.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that shipments for the week were one cargo, 2,700 tons manganiferous ore, and one cargo, 1,800 tons Colorado ore, both to Great Britain. The shipments are restricted by high freights.

Quotations are unchanged. Ordinary 50% ore is 6s. 8d.@7s.; special low phosphorus, 7s.@7s. 10d.; specular ore, 58% iron, 10s. 6d.; S. P. Campanil, 9s. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 10s. 8d. for 35% iron and 12% manganese, up to 17s. 3d. for 20% iron and 20% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton.

London. Oct. 14.

The British Iron Trade Association reports the make of pig iron in Great Britain for the half-year ending June 30 as below, in long tons:

	Tons.	Per Ct.
Foundry and forge	1,968,445	42.6
Bessemer pig	1,999,290	43 3
Basic pig	567,476	12.3
Spiegel and ferro	86,389	1.8
Total	4,621,600	100.0
Total, 1904	4,048,965	....

The increase this year was 572,635 tons, or 12.4%. The more important gains were in Scotland, 155,400 tons; in the Cleveland district, 112,228 tons; in South Wales, 91,988 tons; and in the Cumberland hematite district, 59,440 tons.

Exports of iron and steel and manufactures thereof, including machinery, from Great Britain, for the nine months ending Sept. 30, are valued by the Board of Trade returns as follows:

	1904.	1905.	Changes.
Iron and steel	£20,747,530	£23,256,759	I. £2,509,229
Machinery	15,512,847	16,883,904	I. 1,371,057
New ships	3,334,609	4,421,533	I. 1,086,924
Total	£39,594,986	£44,562,196	I. £4,967,210

Exports of mining machinery for the nine months were valued at £658,618 in 1904 and £623,084 in 1905; a decrease of £35,534. The chief items this year were £198,502 to South Africa and £64,222 to Australia.

The leading items of the iron and steel exports for the nine months were, in long tons:

	1904.	1905.	Changes.
Pig iron	616,540	738,624	I.122,084
Wrought iron	128,673	135,495	I. 6,822
Sheets	278,325	298,419	I. 20 094
Plates	109,951	143,445	I. 33,494
Rails	411,606	414.677	I. 3,071
Steel ingots, etc	88 090	112,351	I 24,261
Tin plates	257,995	274,588	I. 16,593
All other kinds	540,107	635,602	I. 95,495

The total increase in quantities was 322,914 tons, or 13.3%. Exports of pig iron to the United States were 41,286 tons in 1904, and 135,622 tons in 1905; an increase of 94,336 tons. Shipments of tin-plates to the United States were 55,538 tons in 1904, and 51,862 tons in 1905; a decrease of 3,676 tons.

Imports of iron and steel into Great Britain, also of machinery, for the nine months ending Sept. 30 were valued as follows:

	1904.	1905.	Changes.
Iron and steel	£6,205,038	£6,033,280	D. £171,758
Machinery	3,316,730	3,469,453	I. 152,723
Total	£9,521,768	£9,502,733	D. £19,035

The chief items of the iron and steel imports were as follows, in long tons:

	1904.	1905.	Changes.
Pig iron	102 717	87,552	D 15,165
Wrought iron	77,611	67.022	D. 10,589
Structural steel	98,522	87,992	D. 10,530
Steel ingots, etc	414,616	414,583	D. 33
All other kinds	292,625	291,816	D. 809

The total decrease in quantities was 37,126 tons, or 3.8%. Imports of iron ore for the nine months were: Manganiferous, 216,168; other sorts, 5,261,062; total, 5,477,232 tons, an increase of 641,086 tons over 1904. Of the imports this year 140,114 tons of manganiferous and 4,130,998 tons other ores were from Spain.

Heavy Chemicals and Minerals.

NEW YORK, Oct. 25.

The market for heavy chemicals holds its general strength, with decided improvement in several products. American sulphur is firm on the basis of adjustment as outlined in the statement of a recent issue; we note herewith the prices for the American product, most of which is delivered at New York and Portland. The sales for the Louisiana product are disposed of, under contract, for months in advance. Sicilian is quoted the same for Atlantic ports as the Louisiana sulphur.

Pyrite continues unchanged and in steady demand, the supply being practically disposed of for several months in advance.

Sulphate of copper holds steadily, with the slight advance as recently noted.

Nitrate of soda reports the same prices as in the recent advances which are as noted herewith, with a decided upward tendency, both of prices and of freights.

Phosphate companies report a slight advance for domestic quotations, with firm markets and freights higher. In foreign markets there is an advance of ¼ penny, in addition to the slight but steady advance in freights. Indeed a steady but de-

cided advance has been established. Foreign shipments of phosphate from Savannah, Ga., in September were 25,386 tons, largely to Germany and the Netherlands.

PRICES.

Sulphur.		
Louisiana, N. Y., Boston or Portland	ton	$22.125
Philadelphia or Baltimore	"	22.625
Pyrite.		
Domestic, furnace size	Unit	11c
Fines	"	10c.
Imported, lump, At. ports	"	10@11c.
" fines	" "	9½@ 0c.

Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.

Acids.		
Boric, crystals	per lb.	.10
powdered	"	.10¼
Carbonic, liquid gas	"	.12½
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Nitric acid, 36°, 100 lb		$4.75
38°, 100 lb		5.25
40°, 100 lb		5.50
42°, 100 lb		5.75
Oxalic acid, com'l, 100 lb		$5.00@ 5 25
Sulphuric acid, 50°, bulk, ton		13.50@14 50
60°, 100 lb. in carboys		1.05
60°, bulk, ton		18 00@20.00
66°, 100 lb. in carboys		1 20
66°, bulk ton		21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb		$5.35
Nitrate of Soda, 100 lb		2.25@ 2.30
Sulphate of Ammonia, per 100 lb		3.10@ 3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain§ or Europe.
*Fla., hard rock	$7.25@7.50	$10.67@11.85
land pebble	3.75@4.00	7.70@ 8.40
†Tenn., 78@80%	4.35@4.40	10.27@10.67
78%	3.75@4.00	
75%	3.40@3.50	
68@72%	3.00@3.25	
‡So. Car. land rock	3.75@4.00	
river rock	3.50@3.75	6.33@ 6.61
Algerian, 63@70%		7.04@ 7.71
58@63%		6.15@ 6.60
Tunis (Gafsa)		6.00@ 6.60
Christmas Isle		13.28@14.11
Ocean Isle		13.60@14.45
Somme, Fr.		11.39

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C. §These figures are slightly higher owing to the advance (one-quarter penny) plus slightly higher freights.

The English market reports a steady trade with improved conditions in bleach, ash, bicarbonate, caustic soda and salt cake, as compared with last year.

Exports of chemicals from Great Britain, for the nine months ending Sept. 30 are reported as follows, in cwt. of 112 lb.:

	1904.	1905.	Changes.
Copper sulphate	66,040	53,810	D. 12,230
Sulphuric acid	87,786	59 215	D. 28,571
Muriate of ammonia	57,217	68,656	I. 11,439
Bleaching materials	583,569	659,702	I. 76,133
Soda ash	947,9?1	1,068,333	I. 120,372
Bicarb. soda	283,922	324.296	I. 90,374
Caustic soda	967,109	1,096,581	I. 129,472
Soda crystals	154,488	142,318	D. 12,170
Soda sulphate	656,943	542,688	D. 114,255

Imports of chemicals into Great Britain, for the nine months ending Sept. 30, were as follows:

	1904	1905	Changes
Borax and borates	278,151	169.508	D. 108,643
Potash nitrate	185,631	134,860	D. 50,771
Soda compound	230,152	273,933	I. 43,781
Bleach	180,067	171,520	D. 8,547

Imports of sulphur in 1905 amounted to 314,141 cwt. during the nine months, as compared with 297,801 for the same period in 1904, an increase of 16,340 cwt. Imports of iron and copper pyrites (invoiced chiefly for their sulphur value) were 527,508 tons in 1905, as compared with 569,014 in 1904; a decrease of 41,506 tons.

Metal Market.

New York, Oct. 25.

Gold and Silver Exports and Imports.

At all United States Ports in Sept. and Year.

Metal.	September		Year.	
	1904.	1905.	1904	1905.
Gold				
Exp	$2,744,4 8	$1,:12,904	$83.039 998	$42,677,921
Imp	4,2:1.035	5 499,685	68,694,670	30,295,595
Exc	E. $1 496,547	I. $4,086,781	-$14,345 238	E$12,382,326
Silv.				
Exp	3,378,775	5,527,4?9	39,129 920	39,443.210
Imp	2.003,036	3,803.840	19 677,231	21.470 838
Exc	E. $1,375,739	E. $1,721,619	E.$19,452,689	$14,972,377

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce of Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending October 21, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$12,360	$641,698	$744,255	$49,616
1905	32,309,728	10,284,854	28,345,351	3,724 215
1904	73,177,464	5,397,077	30,924,362	834,650
1903	31,522,990	6,071,844	24,560,796	3,133,228

Imports of gold for the week were from France and Great Britain. Exports of silver were to Great Britain.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Oct. 21 gives the following totals, comparison being made with the corresponding week of 1904.

	1904.	1905.
Loans and discounts	$1,137,930,400	$1,026,690,100
Deposits	1,199,796,700	1,023,859,400
Circulation	42,990,800	54,680,500
Specie	240,215,500	193,161,300
Legal tenders	77,587,600	75,386,700
Total reserve	$317,803,100	$268,548,000
Legal requirements	299,949.175	255,964,850
Balance surplus	$17,853,925	$12,583,150

Changes for the week were increases of $1,209,500 in specie, $588,000 in legal tenders, $524,700 in circulation and $2,371,750 in surplus reserve; decreases of $3,594,200 in loans and $2,298,200 in deposits.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York Associated	$193,161,200	
England	160,814,925	
France	583,921,320	$219,683,060
Germany	147,630,000	49,210,000
Spain	74,805,000	111,945,000
Netherlands	32,997,000	29,715,000
Belgium	15,483,335	7,991,665
Italy	124,120,000	16,110,000
Russia	576,850,000	21,620,000
Austria	227,705,000	60,315,000

The returns of the Associated Banks of New York are of date Oct. 21, and the others Oct. 20. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

Shipments of silver from London to the East for the year up to Oct. 12 are reported by Messrs. Pixley & Abell, as follows:

	1904.	1905.	Changes.
India	£7,968,498	£4,755,221	D. £3,213,277
China	372,722	758,688	I. 385,966
Straits	58,103	38,299	D. 19,804
Totals	£8,399,323	£5,552,208	D. £2,847,115

Imports for the week this year were £3,000 from Australia, £5,000 from New Zealand and £240,000 from New York; a total of £248,000. Exports were £81,900 in bar silver and £69,500 in Mexican dollars; a total of £151,400, all to India.

Indian exchange is firm, and all the Council bills offered in London were taken at an average of 16.04d. per rupee. A large amount of gold is reported shipped from Australia for India.

The Treasury Department's estimate of the amount and kinds of money in the United States on Oct. 1 is as follows:

	In Treasury.	In Circulation.
Gold Coin (including bullion in Treasury)	$214,879,824	$652,330,135
Gold Certificates	48,451,990	471,595,979
Silver Dollars	4,979,964	79,436,901
Silver Certificates	5,043,693	469,973,307
Subsidiary Silver	9,706,256	105,539,966
Treasury Notes of 1890	30,142	8,764,858
United States Notes	10,342,090	336,338,926
Currency Certificates	.....	.....
National Bank Notes	16,101,921	500,250,319
Total	$309,535,880	$2,624 230,391

Population of the United States Oct. 1, 1905, estimated at 83,609,000; circulation per capita, $31.39. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the Treasury, and is not included in the account of money held as assets of the Government. This statement of money held in the Treasury as assets of the Government does not include deposits of public money in national bank depositaries, to the credit of the Treasurer of the United States, amounting to $55,483,728. The total amount in circulation shows an increase of $2,571,337 over Sept. 1; and an increase of $62,080,902 over Oct. 1 of last year.

The movement of gold in France for the eight months ending Aug. 31 is reported as follows:

	1904.	1905.
Imports	Fr. 533.604,000	Fr. 532,428,000
Exports	75,718.000	68,396,000
Excess, imp	Fr. 457,886,000	Fr. 464,032,000

This shows an increase of 6,146,000 fr. in the net imports of gold. The movement of silver for the eight months is reported as follows:

	1904.	1905.
Exports	Fr. 83,092,000	Fr. 68,156,000
Imports	67,435 000	66 389.000
Excess exp	Fr. 15,657,000	Fr. 1,767,000

There was a decrease of 13,890,000 fr. in the net exports of silver. The imports of nickel and copper coins for the eight months were 96,000 fr. in 1904, and 100,000 fr. in 1905; exports were 325,000 fr. in 1904, and 245,000 fr. this year.

The silver market has been quiet, with little change in prices and a good demand.

SILVER AND STERLING EXCHANGE.

Oct.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Oct.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
19	4.86	62 1/4	28 3/16	23	4.86	62 1/4	28 3/16
20	4.86	62 1/4	28 1/16	24	4.86	62 1/4	28 1/16
21	4.86	62 1/4	28 1/16	25	4.8680	62 1/4	28 1/16

New York quotations are for fine silver, per ounce, Troy. London prices are for sterling silver, .925 fine.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars	$0.47	$0.49
Peruvian soles and Chilean pesos	.43	.45
Victoria sovereigns	4.85 1/2	4.87 1/2
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

Other Metals.

Daily Prices of Metals in New York.

October.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
19	16 1/4 @16 1/2	16 1/16 @16 3/8	71 1/8	32 3/8	4.85	6.15 @6.20	6.00 @6.05
20	16 1/4 @16 1/2	16 1/16 @16 3/8	71 1/8	32 1/2	4.85	6.15 @6.20	6.00 @6.05
21	16 1/4 @16 1/2	16 1/16 @16 3/8	.....	32 1/2	4.85	6.15 @6.20	6.00 @6.05
23	16 1/4 @16 1/2	16 1/16 @16 3/8	71 7/8	32 1/2	4.85	6.15 @6.20	6.00 @6.05
24	16 1/4 @16 1/2	16 1/16 @16 3/8	71 3/4	32 1/2	4.85	6.15 @6.20	6.00 @6.05
25	16 1/4 @16 1/2	16 1/16 @16 3/8	71 1/4	32 1/2 @32 3/4	4.85	6.15 @6.20	6.00 @6.05

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic.

Copper.—The inquiry for export, which held out promises last week, has not come up to expectations. The market at home has right along been more or less nominal, and the week has therefore been a very quiet one. However, all reports indicate that consumption both here and abroad continues at an undiminished rate, and larger orders will soon have to be placed for next year's shipment. The closing quotations are nominal at 16¼@16½ for lake; 16⅛@16⅜ for electrolytic in ingots, cakes or wirebars; 15⅝@16c. for casting copper.

The standard market has shown the same characteristics which were pointed out in our last isue, in so far as there has been quite a backwardation. At one time spot reached £72 15s. and three months copper £71 15s., but the market is easier at the close, with spot at £71 15s. and three months at £70 5s.

Refined and manufactured sorts we quote: English tough, £74; best selected, £75; strong sheets, £83; India sheets, £78; yellow metal, 7d.

Exports of copper from New York for the week were 4,829 long tons. Our special correspondent reports that the exports from Baltimore for the week were 1,404 long tons of fine copper.

Imports and exports of copper and copper material in Great Britain for the nine months ending Sept. 30 were as follows, in long tons; the totals giving the equivalents in fine copper:

	1904.	1905.	Changes.
Copper ore	61,900	72,878	I. 10,978
Matte and precipitate	49,411	50,888	I. 1,477
Fine copper	68,532	53,477	D. 15,055
Total, fine copper	99,428	86,209	D. 13,219
Exports	36,887	36,652	D. 235
Balance	62,541	49,557	D. 12,984

Of the imports in 1904 the United States furnished 146 tons of ore, 3,984 tons of matte and 36,692 tons fine copper; which compares with 205 tons of ore, 3,698 tons of matte and 23,279 tons fine copper this year.

Tin.—The demand is active and has resulted in a fair volume of business at prices which followed closely the fluctuations in London. The close is 32½@32¾, depending upon deliveries.

The London market has moved within narrow margins and closes steady at £148 12s. 6d. for spot and £147 15s. for three months.

Imports of tin into Great Britain, with re-exports of imported metal, for the nine months ending Sept. 30 are reported as follows, in long tons:

	1904.	1905.	Changes
Straits	21,975	24,236	I. 2,261
Australia	3,105	2,922	D. 183
Other countries	1,954	1,775	D. 179
Total	27,034	28,933	I. 1,899
Re-exports	20,126	22,070	I. 1,944
Net imports	6,908	6,863	D. 45

A large part of the exports were to the United States.

Lead.—The leading interest is still billing its lead at 4.85 New York and 4.77½ St. Louis.

The London market, after declining to £14 12s. 6d., closes firmer at £14 17s. 6d. for Spanish and £15 for English lead.

Imports and exports of lead in Great Britain for the nine months ending Sept. 30 were as follows, in long tons:

	1904.	1905.	Changes.
United States	28,393	19,887	D. 8,506
Spain	83,457	77,152	D. 6,305
Australia	55,532	56,140	I. 608
Germany	13,725	12,874	D. 851
Other countries	6,921	2,613	D. 4,308
Total imports	188,028	168,666	D. 19,362
Exports	26,246	31,998	I. 5,752
Balance	161,782	136,668	D. 25,114

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of Oct. 7, that silver has been 14.50 reales per quintal. Exchange is 32.83 pesetas to £1. Local quotation for pig lead is 76 reales per quintal, which, on current exchange, is equal to £12 19s. per long ton, f. o. b. Cartagena. Shipments for the week were 61 tons argentiferous to Antwerp, and 200 tons desilverized lead to London.

Spelter.—There has been a very active demand for export, but there does not seem to be sufficient surplus stock to satisfy it. A good business has been doing for home trade, and prices close firm at 6.15@6.20c. New York, 6@6.05c. St. Louis.

The close in London is £28 12s. 6d. for good ordinaries and £28 17s. 6d. for specials.

Imports and exports of spelter in Great Britain for the nine months ending Sept. 30 were as follows, in long tons:

	1904.	1905.	Changes.
Spelter	64,459	63,149	D. 1,310
Zinc sheets, etc	16,974	15,403	D. 1,571
Total imports	81,433	78,552	D. 2,881
Exports	5,833	6,179	I. 346
Balance	75,600	72,373	D. 3,227

Imports of zinc ore are not reported. Exports of spelter are only those of the metal, and do not include spelter in brass or other alloys.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Oct. 7, that, with spelter continually rising local prices for both blende and calamine are growing daily stronger. Blende, 35% zinc, is 95 fr.; calamine, 30% zinc, 72 fr. per ton.

Antimony.—A more active business is reported at unchanged quotations.

Nickel.—Quotations for large lots, New York or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Platinum.—Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones, $1 per gram.

Quicksilver.—The market is quiet. The New York quotation is $40 per flask of 75 lb. for large orders, and $40.50@$41 for small lots. San Francisco prices hold steady at $39 for domestic orders, and $37.50@$38 for export business. The London market is unchanged, £7 2s. 6d. being quoted both by first hands and jobbers.

Imports of quicksilver into Great Britain, with re-exports of foreign metal, for the nine months ending Sept. 30, are reported as follows, in pounds:

	1904.	1905.	Changes.
Imports	2,416,066	2,534,106	I. 118,040
Re-exports	1,308,912	1,291,267	D. 17,645
Net imports	1,107,154	1,242,839	I. 135,685

The larger part of the imports is from Spain; some is also received from Austria.

Missouri Ore Market.

JOPLIN, Oct. 21.

The highest price reported paid for zinc was $51.50 per ton for three bins of extra choice ore. The assay basis price was $47@$49 per ton of 60% zinc. Buyers started a reduction of $2 per ton early in the week, but heavy rains and a decreased output changed their actions toward the close of the week. Choice ore was reduced $1.50 per ton, but the assay and general reduction amounted to only $1 per ton. Lead prices were strong at $64.50 for choice bins and a general price of $64 per ton for 80% grades. Large sales of silicate ore reduced the average price for the week nearly $3 per ton, the average being $42.10, against $45.08 the previous week. Lead averaged approximately the same, $63.60 per ton.

Spring river was out of its banks and for three days the mines at Badger could not be operated, being entirely surrounded by water, but strong dikes kept the water from the mines, and there will be no further loss of time, as the mines are again outputting. The small seepage can easily be handled by the additional pumps installed to drain the mines after the inflow of last July. Appearances point to the heaviest outputting of the year, as long as the weather remains favorable to mining. From 10,000 tons behind last year at the end of May, the shipment is now only 3,795 tons short.

Following are the shipments of zinc and lead from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Carterville-Webb City..	2,182,500	692,870	$70,190
Joplin	2,449,340	164,510	62,825
Galena-Empire	1,079,720	149,070	27,870
Granby	1,455,000	110,000	26,960
Neck City	544,190	.....	13,330
Aurora	784,550	.....	12,100
Badger-Peacock	487,690	6,520	11,180
Duenweg	389,680	61,150	10,530
Baxter Springs	351,720	57,730	8,180
Oronogo	284,700	.....	6,855
Alba	226,050	.....	5,540
Carthage	199,400	.....	4,880
Prosperity	85,220	70,840	4,140
Spurgeon	106,440	2,130	2,190
Reeds	65,560	.....	1,470
Scott City	54,840	.....	1,230
Zinc, Ark	52,080	.....	1,040
Beef Branch	34,160	13,730	800
Totals	10,832,780	1,328,550	$271,310
42 weeks	406,723,100	49,810,850	$10,584,295
42 weeks last year	414,312,240	52,795,280	8,501,905
Zinc value, the week,	$229,060; 42 weeks		$9,104,235
Lead value, the week,	42,250; 42 weeks		1,480,060

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months.

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
Jan.	33.33	52.00	Jan.	55.55	61 50
Feb.	33.63	52.77	Feb.	56.37	57.62
March	35.40	47.40	March	57.20	57.20
April.	35.75	42.88	April.	58.00	58.00
May	34.87	43.31	May	57.77	58.27
June.	32.93	40.75	June.	56.60	57.80
July	33.37	43.00	July	53.00	58.00
August	37.55	48.83	August	53.00	58.00
September.	40.18	46.75	September.	53.50	63.50

Wisconsin Ore Market.

PLATTEVILLE, Oct. 21.

The demand for zinc ore during the last week has equaled the output, and in consequence the price jumped up to $50, which was the price paid by all three of the buyers for 60% zinc. In several instances a higher price was paid. The cobbed ore from the Ross Bros. mine sold at $52 per ton. Nearly all of the low-grade ore, except that which the producers are holding for treatment upon the completion of their roasting and separating plants, several of which are in course of erection, has been taken up by the buyers for the oxide works and the local custom separator. The general conditions are quite favorable for good prices during the winter, owing to the fact that the bins are pretty well emptied, and it is reported that the smelters are not overstocked.

Lead is selling strong at $28.50@$29 per 1,000 lb., with no surplus in sight.

Mining Stocks.

New York. Oct. 25.

The stock market continues undecided, and the fluctuations daily show rather professional work than any decided tendency. The industrial shares have been rather firm, and most of them close well. Republic Iron & Steel sold at $26½, and $97 for the preferred. Tennessee Coal, Iron & Railroad closed at $89; United States Steel at $38¾ for the common, and $105¼ for the preferred.

Amalgamated Copper was little affected by the announcement of the quarterly dividend unchanged at 1¼%; it closes at $85. Of the other copper stocks, Granby sold at $9; Utah at $26½; Tennessee at $35. Greene Consolidated Copper was stronger at $27@$27½, on moderate sales.

In the Comstock and Tonopah shares there were only small dealings and moderate interest.

Boston. Oct. 24.

There has been continued profit-taking in mining shares in this market, but prices have stood up well under the pressure, and the feeling is as confident as ever that the market which is here will continue throughout the winter. Notwithstanding the fact that the wire service to Michigan points was pretty well tied up for a few days, transactions in certain stocks have been of large volume. The boom in North Butte mining made considerable money for the Lake people, and they have been the largest factor in local speculation. Four stocks have attracted particular attention the past week. On Friday last Calumet & Hecla sold up from $668 to $685, a $17 advance. This followed the advertisement wherein a copper share mining crash was predicted and was an offset whereby it was cited that Calumet & Hecla had not participated in the general advance. Copper Range started up the next day and rose from $71.50 to $76.50; the latter closed off $1.75 from this. It is estimated that this company will earn about $6.50 per share the current year. There are now 2,100 stockholders of Copper Range.

Old Dominion, which has been slow, boomed to $34.25 Monday, in anticipation of an initial dividend, which was made 50c., payable Dec. 15. The close tonight was $31.25, against $28.62½ a week back. This dividend was made possible by the declaration of $6.50 per share on the 23,000 shares of United Globe mining stock, all owned by the Old Dominion Co. of Maine, which is a holding company. In addition it owns 90% of the stock of the Old Dominion of New Jersey, which operates the mines. The latter will wipe out its debt, incurred in building a smelter, by Jan. 1 next, it is expected. Today Centennial was put up to $34.12½, which is a $4.12½ rise for the week. A favorable private report on the property was responsible for the sharp advance today. Allouez has been weak after the late booming tactics and fell $3.50 to $44.75. Atlantic is also off $1.25 to $26.50, and Franklin $2 to $17.75. Isle Royale has varied from $24.25 to $26.37½, and Tecumseh is off $1 to $13.25. These all had substantial advances a week or so ago.

Osceola continues in good demand on early dividend prospects, and rose $4 to $115. Utah touched $48 and North Butte $57.37½. United States slid off $2 to $35.50 on the announcement that Adolph Lewisohn had retired from the directorate.

Mohawk rose $1.50 to $61.50, reaching almost $2. Wolverine made a new high record at $129 today. The Calumet & Hecla, having purchased the Central mine, stockholders of the latter will get $8 per share in liquidation.

Some attention has been paid to Arnold, Ashbed and Humboldt mining shares this week. On the curb Ahmeek rose to $66.50, Arizona Commercial to $22.25, and Utah Copper is $27. Sales of Mexico Consolidated are reported at $10.50@$11, and $70 is bid for St. Mary's Mineral Land.

Colorado Springs. Oct. 20.

The past week has been a normal one on the local exchange, with the amount of trading not above the average. Several of the better stocks scored slight advances, but the majority dropped off a fraction. El Paso has been gaining gradually from 68c. of one week ago to 74c. on today's market. Findley has also made a fractional advance, selling today at 83⅞c. Isabella has also made a gain, selling for 27¼c. Elkton dropped off from 54½ to 53c. Gold Sovereign made a decline from 10⅜ to 9½c. Acacia also lowered its quotation from 12⅝ to 12c. Portland has been selling during the week for $2.20 per share.

San Francisco. Oct. 19.

The only feature in the market has been a demand for Consolidated California & Virginia, which sent the price up to $1.65. The other Comstocks were not much affected and were rather dull. Ophir sold at $5.50@$5.75; Hale & Norcross, $1.25; Mexican, $1.15; Sierra Nevada, 32c. per share.

The new stocks were fairly active and prices steady. Buying orders started light, but improved later. Montana Tonopah brought $2.45; Tonopah Midway, $1.40; Jumbo, 74c.; Jim Butler, 62c.; Goldfield, 59c. per share.

Oil stocks continue dull. Claremont sold at 80c.; Independence, 23c. Most of the trading was in those stocks and in Associated Oil certificates.

Dividends.

Company.	Payable.	Rate.	Amt.
Alaska Mexican	Oct. 28	$0.30	$54,000
Alaska Treadwell	Oct. 28	1.00	200.000
Amalgamated Copper	Nov. 27	1.25	1,937,500
Bunker Hill & Sullivan	Nov. 4	0.60	180,000
Bethlehem Steel, pf	Nov. 1	1.75	262 500
Continental Zinc	Oct. 1	0.50	11 000
El Paso	Oct. 25	0.01	24,000
Green Con. Copper	Oct. 30	0.40	345,600
Homestake Gold	Oct. 25	0.50	109 200
Le Roi No. 2	Oct. 30	0.24	28,800
New Central Coal	N v. 1	0.40	20,000
Old Dominion	Dec. 15	0.50	144,000
Penna. Steel, pf	Nov. 1	3.50	577,500
Philadelphia Co	Nov. 1	0.75	434,295
Platteville Lead & Zinc	Oct. 14	10.00	5,000
Portland Gold		0.10	300,000
St. Eugene Con	Oct. 30	0.02	64,040
Tenn. Coal Iron & R. R.	Nov. 1	1.00	225,536
Tenn. Coal, Iron & R. R., pf.	Nov. 1	2.00	4,960
U. S. Cast Iron Pipe & Fdy.	Dec. 1	1 00	125,000
Vindicator		0.03	33.000
United Copper, pfd	Nov. 15	3.00	150,000

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt.
Caledonia	Nov. 17	Dec. 8	$0.01
Confidence	Nov. 12	Dec. 4	0.20
Crown Point	Nov. 14	Dec. 5	0.10
Dudley, Cal	Oct. 30	.....	0 01
Exchequer	Oct. 10	Oct. 31	0.05
Hale & Norcross	Nov. 2	Nov. 28	0.10
Justice	Nov. 16	Dec. 9	0.05
Mexican	Oct. 30	Nov. 20	0.15
Savage	Nov. 8	Nov. 29	0.10
Sierra Nevada	Nov. 2	Nov. 23	0.10
Union Con	Nov. 13	Dec. 4	0.10
Utah Con., Nevada	Oct. 31	N v. 21	0.05
Yellow Jacket	Oct. 17	Nov. 22	0.10

St. Louis. Oct. 21.

	High.	Low.
Adams	$ .40	$ .25
American Nettie	.09	.07
Center Creek	2.00	1.50
Central Coal & Coke	65.25	64.75
" " " pfd.	81.00	80.50
Columbia	1.00	.25
Con. Coal	30 00	28.00
Doe Run	142 00	139.00
Granite Bimetallic	.20	.15
St. Joe	16.50	15 50

LONDON. (*By Cable.**) Oct. 24.

	£	s.	d.
Camp Bird	1	16	3
Consolidated Gold Fields	6	5	0
De Beers	17	15	0
Dolores	2	0	0
East Rand	6	17	6
El Oro	1	18	6
Esperanza	5	7	6
Modderfontein	8	3	9
Rand Mines	8	16	3
Rio Tinto	67	10	0
Simmer and Jack	1	9	6
Stratton's Independence	0	9	0
Tomboy	1	12	0

*Furnished by Wm. P. Bonbright & Co., New York.

STOCK QUOTATIONS.

NEW YORK. Week Oct. 18.

Name of Company.	High	Low	Clg	Sales
*Amalgamated	85⅞	83½	84⅞	199.480
Anaconda	119⅞	115¾	119⅞	7,8 0
British Col. Copper	8⅜	8	8⅛	5,000
Federal	122½	122	122	500
Federal, Pf	107¼	97	98¼	5,>60
Greene Copper	28¼	27	27	42,000
Greene Gold	5⅛	4⅜	5⅛	11,300
Mitchell	9	7¾	8¼	16,700
Tennessee Copper	34⅜	33½	34⅜	1,800
Union Copper	1 1/16	1 1/16	1 1/16	2,900
United Copper,	34½	32½	34¼	8 200
United Copper, Pref	76½	75½	76½	2,371
White Knob	⅝	⅝	⅝	200

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	131½	125⅞	130⅛	156,700
Am. Smelting & Ref., Pf.	122⅞	120½	122¾	5,910
Colorado Fuel & Iron	47½	44¾	46⅝	22,075
Pittsburg Coal	16	15¼	15⅝	1 700
Republic I. & S.	27½	24¾	26½	50,730
Republic I. & S., Pf	97½	94⅛	96⅛	27,000
Tenn. C. & I	90	85¼	89	28,450
U. S. Red. & Ref	31	28½	30⅛	2,400
U. S. Red. & Ref., Pf	71	65½	70	3,500
U. S. Steel	39⅛	37	38½	317,870
U. S. Steel, Pf.	105½	103⅞	105	57,270
Bethlehem Steel	29⅞	29	29⅞	144
Standard Oil	672¾	667	667	257

BOSTON.

Allouez	48½	44¾	45⅜	19 739
Amalgamated	85¾	83½	85⅜	15,289
Atlantic	27⅞	26½	26½	7.090
Bingham	32⅜	31½	32½	2,919
Boston Consolidated	12	10¾	11½	22,500
Calumet & Hecla	687	666	685	359
§Centennial	34⅛	28¾	33⅞	37,886
Mercur	.60	.56	.59	3,630
Copper Range	76½	71⅜	74¾	46.892
Daly-West	14½	14	14¾	1,105
Franklin	19⅞	18¼	18¾	5,682
Granby	9⅛	8¾	8⅞	5,263
Green Con. Copper	28¼	27½	27⅜	13,897
Isle Royale	26½	24¼	25	4,191
‡Mass	11½	10⅜	10½	4,935
Michigan	16¼	14⅛	15	12,788
Mohawk	61½	59	59⅝	4,384
*North Butte	57¾	55½	56⅜	18,473
Old Dominion	34¼	28	31¼	31,320
*Osceola	115	109¾	114	6,476
*Parrot	28¼	27½	27½	1,205
Phoenix	2	1¾	1⅞	4,142
Rhode Island	8¼	7⅛	7⅞	3,051
Shannon	8¾	8⅜	8½	5,270
Tamarack	130	125	126	230
Tecumseh	14½	13½	13½	5,681
United Copper, com	34⅜	33½	34	8,540
United States	36	35⅝	35⅞	15,911
Utah	48	46	47¼	5,058
Wolverine	129	122	126¾	681

PHILADELPHIA.

Cambria Steel	29¾	28¾	29½	13,764
Philadelphia Co	49	48½	48¾	6,118
Tonopah	12⅞	12¾	12¾	340

PITTSBURG.

Crucible Steel	13¾	13¼	13½	2,660
Crucible Steel, Pref	67⅞	66¾	67¾	980
Tonopah Ext	6.00	6.00	6.00	3,750

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	53¾	53¾	51	51¾
El Paso	75	75	70	70¾
Isabella	26	28	26	27¾
Portland	218	218	205	210
Vindicator	80	84½	77	77

SAN FRANCISCO.

Best & Belcher	1.45	1.55	1.35	1.50
Bullion	.38	.39	.38	.38
Caledonia	.43	.46	.43	.45
Confidence	.76	.78	.75	.75
Con. Cal. & Va	1.70	1.90	1.60	1.90
Gould & Curry	.24	.26	.23	.26
Hale & Norcross	1.20	1.20	1.10	1.15
Mexican	1.15	1.35	1.15	1.30
Occidental Con	.87	.87	.87	.87
Ophir	5.62½	5.87½	5.62½	5.62½
Savage	.52	.53	.51	.52

*Ex-dividend. †1st Instalment Paid.
‡Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.698	26.423	27.930
February	57.592	61.025	26.665	28.047
March	56.741	58.040	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.430	57 832	25.578	26.664
June	55.673	58.42>	25.644	26.910
July	58.095	58.917	26.760	27.163
August	57.806	60.259	26.591	27.822
September	57.120	61.695	26.349	28.528
October	57.923	.....	26.760	.....
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	New York.				London.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15 008	12 553	15 128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.963
March	12.299	15.125	12.551	15.250	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13 000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	15.664	12.468	15.725	56.952	69.830
Sept.	12.495	15.965	12.620	15.978	57.645	69.667
Oct	12.993	.....	13.118	.....	60.012	.....
Nov	14.284	.....	14.456	.....	65.085	.....
Dec	14.661	.....	14.849	.....	66.384	.....
Year	12.823	.....	12.990	.....	58.587	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan	28.845	29.325	July	26.573	31 760
Feb.	28.087	29.262	August	27.012	32.866
Mar	28.317	29.523	Sept	27.780	32.095
April	28.132	30.525	Oct	28.596	.....
May	27.718	30.049	Nov	29.185	.....
June	26.325	30.329	Dec	29.286	.....
			Av. year.	27.986	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904	1905.
Jan	4.347	4.552	July	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	4.665
Mar	4.475	4.470	Sept.	4.200	4.850
April	4.475	4.500	Oct	4.200	.....
May	4.423	4.500	Nov.	4.200	.....
June	4.496	4.500	Dec	4.600	.....
			Av., year.	4.309	.....

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905	1905.
January	4.863	6.190	4.673	6.032	25.063
February	4.916	6.139	4.717	5.989	24.594
March	5.057	6.067	4.841	5.917	23.825
April	5.219	5.817	5.038	5.667	23.813
May	5.031	5.434	4.853	5.284	23.594
June	4.760	5.190	4.596	5.040	23.875
July	4.873	5.396	4.723	5.247	23.938
August	4.866	5.706	4.716	5.556	24.675
September	5.046	5.887	4.896	5.737	26.375
October	5.181	.....	5.033	.....	.....
November	5.513	.....	5.363	.....	.....
December	5.872	.....	5.720	.....	.....
Year	5.100	.....	4.931	.....	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.